Reference Library

Substances and behaviors, chapter by chapter

- **One chapter per substance or behavior**

Open-source harm-reduction framework. Not medical advice. Use alongside clinical care.

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How to use this library

Each chapter covers one substance, or a small family of related ones, and follows the same order: an emergency box first, then what it does, the danger points, getting safe, the first weeks, rebuilding, genetics and tests, milestones, and short notes for clinicians and for families.

Start from what was actually used. If you do not know what was taken, start with **Fentanyl and the Unknown Supply**, because unknown supply is the biggest single danger. If more than one substance is involved, read the chapter for the most dangerous one first: alcohol, benzodiazepines, GHB, then opioids, and then the others.

Every chapter links back to the Handbook chapter **The 12 Safety Rules**. These guides give no doses and no tapering schedules; where the source gave one, the chapter names the principle and sends you to a prescriber.

If it is…	Go to
Alcohol	Sedatives: Alcohol
Xanax, Valium, Klonopin, Ativan, Ambien, gabapentin, pregabalin	Sedatives: Benzodiazepines, Z-drugs and Gabapentinoids
GHB, GBL, 1,4-BD	Sedatives: GHB and GBL
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Cannabis, nicotine, inhalants, poppers, khat	Cannabis, Nicotine and Inhalants
Gambling, shopping, gaming, compulsive sexual behavior, screens, debt	Behavioral Addictions

SEDATIVES

Alcohol

In this chapter. Alcohol withdrawal can kill, so this chapter starts with who needs a medical detox and ends with how a life without drinking gets built. The Kernel's view: alcohol was solving a real problem (a nervous system that would not quiet) in a costly way. Recovery means treating that problem properly. This guide is US-centred; check local services elsewhere. Shared rules are in the Handbook chapter "The 12 Safety Rules."

EMERGENCY BOX - **Call 911 or go to an emergency room now** for: a seizure; hallucinations; severe confusion; a fever with shaking and a racing heart; or, in a heavy drinker, confusion, memory problems, odd eye movements or loss of coordination (possible Wernicke's encephalopathy, a vitamin B1 emergency). - **Do not stop suddenly** if you drink daily, drink in the morning to stop shaking, get sweaty, shaky or sick when you go a few hours without, or have ever had a withdrawal seizure or hallucinations. Call a doctor, urgent care or a detox facility first. - Crisis: call or text **988**. SAMHSA: **1-800-662-4357**. Crisis Text Line: text HOME to **741741**.

What alcohol does and why it hooks people

Alcohol touches nearly every major brain system at once. That is why its withdrawal is among the most complex and dangerous. **[Established]**

System	What alcohol does	What happens when it is removed
GABA (the brake) System	Strengthens the brain's main calming signal: calm, ease, What alcohol does sleep	Brakes are worn down; the brain runs "hot": tremor, What happens when it is removed anxiety, insomnia, seizures
Glutamate (the accelerator)	Quiets it; the brain builds more accelerators to compensate	Over-excitation; seizures and delirium tremens at the extreme
Dopamine	Raises reward signalling indirectly	Flatness, low motivation, depression for weeks to months
Serotonin	Lifts mood briefly	Low mood, irritability, poor sleep

System	What alcohol does	What happens when it is removed
Endorphins	Releases warmth and social comfort	Raw emotional pain, loneliness often mistaken for “wanting a drink”

Alcohol is also broken down into acetaldehyde, a toxic by-product. How quickly you clear it varies with genes and affects flushing, organ damage and drinking risk. **[Established]**

Years of heavy drinking also deplete thiamine (B1), magnesium, folate and other nutrients; injure the liver, gut and heart; and suppress immunity. Ask for liver tests, a nutrition check and a heart check at the start.

Danger points

- **Withdrawal.** In a physically dependent person, a sequence of anxiety, tremor, agitation, seizure and delirium tremens can begin 6 to 48 hours after the last drink, sometimes without warning. Delirium tremens carries a death rate commonly cited as up to about 15% without treatment. **[Established]**
- **Swapping sedatives.** Alcohol to benzodiazepine transfer is the most medically dangerous swap in recovery. Phenibut, sold as a “GABA” product, is also addictive. Avoid it.
- **Mixing.** Alcohol with benzodiazepines, opioids or GHB multiplies breathing risk. See the benzodiazepine and GHB chapters below.
- **Hidden alcohol.** In early recovery, avoid cooking wine and alcohol-based mouthwash.
- **A lapse is information and a medical risk.** If you were drinking daily again, go back to supervised detox. Do not stop alone a second time.
- **Supplements are not detox.** They do not prevent withdrawal seizures.

Getting safe: the medical picture

Medical detox is required, not optional, if any of these apply: - you drink daily and have for more than a couple of weeks; - you have physical symptoms between drinks (shaking, sweating, racing heart, nausea, anxiety that alcohol relieves); - you have ever had a withdrawal seizure or delirium tremens; - you also use benzodiazepines or other sedatives, or GHB; - you know you carry a GABRA2 high-risk variant (tell the team) **[Kernel hypothesis]**.

If none apply and you drink problematically without dependence, you can plan changes with your doctor, who can still check.

Who supervises. A physician or addiction medicine team decides between outpatient and inpatient detox. Inpatient is typical for severe dependence, a past seizure, other medical illness or an unsafe home. Teams

prescribe medicines to prevent seizures, monitor with a standard symptom scale, and give high-dose thiamine. This guide gives no schedule; your team sets it.

If withdrawal starts and you are not in care, call a doctor, go to urgent care or call 911. The highest-risk window is the first few days.

Medications that reduce relapse are the best-evidenced in addiction medicine, and fewer than 1 in 10 people who could benefit get them. Ask your physician about:

Medicine	Notes
Naltrexone (daily pill or monthly injection)	Strong evidence, FDA-approved. Blocks the reward signal. Kernel hypothesis: stronger benefit with the OPRM1 A118G variant; the research is mixed **[Emerging]**
Acamprosate	Strong evidence, FDA-approved. Cleared by the kidneys, which helps when the liver is damaged
Disulfiram	Moderate evidence; works mainly with supervised dosing; not for everyone
Gabapentin	Moderate, off-label; can itself cause dependence, so a time limit and monitoring are needed. Not for stopping on your own
GLP-1 drugs (e.g. semaglutide)	**[Emerging]**; discuss with your physician

Medication and the Kernel are not rivals. Review each medicine's purpose and duration with your prescriber over time rather than running it on autopilot.

The first weeks: what to expect

- **Days 3 to 7:** the acute risk passes; profound tiredness, emotional rawness, poor sleep, low mood, strong cravings. Rest. Eat.
- **Weeks 1 to 4:** cravings come in waves, not all day. Exercise starts to help.
- **Post-acute waves (up to about two years):** waves of anxiety, low mood, insomnia or craving triggered by stress, bad sleep, illness, grief, conflict, sugar, caffeine or alcohol cues. This is the nervous system recalibrating, not relapse. The wave passes. [Emerging: duration varies]
- **Sleep:** alcohol sedates; it does not give real sleep. It nearly eliminates REM sleep and fragments the night. Vivid dreams in early recovery are REM coming back, which is healing. Insomnia is among the most commonly cited relapse drivers, so protect sleep.
- **Three kinds of craving** (Kernel framework): *anxiety-driven* (the most common; the nervous system wants its alarm-silencer), *flat and joyless* (dopamine), and *lonely and raw* (the warmth alcohol produced). Naming it changes the response: 1. Name the type. 2. Slow breathing with a long exhale.

3. Change one thing in your environment: move, go outside. 4. Contact one person, even a short text. 5. Do one natural reward: movement, music, a task you enjoy. 6. Write down trigger, type, intensity, what you did. It becomes data for your clinician.

Rebuilding: natural architecture and what drinking was treating

The Kernel asks what drinking was *doing* for you, then replaces each job:

Job alcohol did	Natural replacement
Quieted anxiety	Daily breathwork and a contemplative practice; exercise; nature; treatment of an underlying anxiety disorder
Social ease and warmth	In-person community where the mask is optional (peer groups, sober communities); service. The goal is connection that does not need disinhibition
Pleasure and reward	Several sources: vigorous exercise, creative mastery, competition, achievement. No single one will match alcohol
"The day is done" ritual	Keep the same time and place; change the content (tea, sparkling water, a non-alcoholic drink)

The Kernel's natural GABA architecture is a daily contemplative practice, vigorous aerobic exercise several times a week, a creative practice with depth, real community, scheduled time in nature, and service, which many people in long-term recovery call their most reliable source of wellbeing. **[Kernel hypothesis]**

Nutrition and supplements. After medical stabilization, ask your clinician and pharmacist about replenishing thiamine, magnesium, B vitamins and folate, protein and vitamin D. Dose with your clinician or pharmacist. Check liver status first: some supplements harm a diseased liver. Check every addition with a pharmacist and an interaction checker. Supplements support recovery; they do not replace abstinence, time or medicine. **[Emerging]** Peptides in the Kernel are research compounds; use only with a physician. If psychotic symptoms are present, no dopamine-raising supplements (such as tyrosine or rhodiola) until a psychiatrist clears it. 5-HTP only on physician advice and never with serotonergic medicines.

Watch for addiction transfer. Cannabis is a common swap for the anxious drinker. Benzodiazepines are the dangerous one.

Trauma. Start trauma processing after the biological floor (sleep, nutrition, stability, medical support) is in place. The Kernel's case example has trauma therapy triggering relapse when started too soon.

Liver. The liver regenerates well. Repeat liver tests at about 1, 3 and 6 months of abstinence, and check heart health early. Significant recovery is possible even after serious damage. [Established, in general]

Genetics and tests

Alcohol use disorder is about 50 to 60% heritable. [Established] The Kernel's gene-by-gene stories are hypotheses. **Never delay detox or treatment for test results.**

Gene	Kernel hypothesis
GABRA2	Weaker brake; stronger relief from alcohol; harder withdrawal; tell the detox team. [Kernel hypothesis; evidence mixed]
OPRM1 A118G	Stronger reward; may predict a better response to naltrexone. [Emerging]
COMT Met/Met ("Sage")	Anxious drinking; anxiety is the main target. [Kernel hypothesis]
ALDH2, ADH1B	Alcohol flushing and acetaldehyde burden; liver testing matters. [Established for ALDH2 flushing]
MTHFR, DRD2, SLC6A4, CYP2E1	Methylation, reward, anxiety sensitivity, oxidative stress. [Kernel hypothesis]

No test? Ask yourself: did alcohol mainly calm you, or make you feel alive? Is there a multigenerational family history? Did you flush or race more than others? Share the answers with your clinician.

Milestones

Timelines are Kernel projections and individual results vary. The Kernel's 12-month case figures (for example 72% vs 25% for an adherent protocol vs standard care) are archetype projections, not trial results.

When	Focus
Days 0 to 7	Supervised detox if dependent. Thiamine. No unsupervised stop.
0 to 3 months	Sleep, nutrition, medicine review, craving plan, ritual replaced, support contacts
3 to 12 months	Waves thin out; liver and heart tests; build exercise and calm practices; identity and money work
Year 1 to 2	Brain and liver recovery continues [Kernel projection]; waves rare; trauma work if ready
Year 3	Medication reviewed, not autopilot; supports step down to upkeep, not to zero

When	Focus
Year 5	Triggers become life events (grief, toasts); service and mentoring
Year 10	Stewardship. Sedatives stay off the table. A return to daily drinking means supervised detox

FOR CLINICIANS

- Triage dependence first. Prior seizure, delirium tremens, co-use of sedatives and a suspected high-risk GABRA2 profile support inpatient care.
- Thiamine from the start; screen for Wernicke's. Check LFTs, magnesium, folate, cardiac status.
- Offer relapse-prevention medication early (naltrexone, acamprosate first-line). Consider renal function for acamprosate; set a review date and exit criteria for gabapentin.
- Avoid open-ended benzodiazepine or phenibut use after detox.

For families and supporters

- Heavy daily drinking: do not push someone to quit abruptly alone. Help them reach a doctor or detox.
- Know the emergency signs above and call 911.
- Stay with someone showing confusion, seizure or severe shaking.
- Support sleep, meals and routine; praise effort, not just days sober.
- A lapse means "call the team", not "it failed."

KEY POINTS

- Alcohol withdrawal can be fatal; daily drinkers do not stop suddenly.
- Confusion or odd eye movements in a heavy drinker: go to the ER.
- Supplements do not replace detox or medicine.
- Waves of anxiety or craving for up to two years are neurobiology, not relapse.
- Avoid swapping into benzodiazepines, phenibut or other sedatives.
- A lapse is information and a medical risk; return to supervised care.

Benzodiazepines, Z-drugs and gabapentinoids

> **In this chapter.** For people who depend on a benzodiazepine (Xanax, Valium, Klonopin, Ativan, Librium, Restoril), a Z-drug (Ambien, Lunesta) or a gabapentinoid (gabapentin, pregabalin), whether prescribed or not, plus a section on what to do if the supply was cut off. This is among the few withdrawals that can directly kill. This guide supports a prescriber-led taper and gives no schedule. US-centred. See the Handbook chapter "The 12 Safety Rules."

EMERGENCY BOX - **Call 911 or go to an emergency department now** for: a seizure or any involuntary shaking; severe confusion or not knowing where you are; hallucinations; a racing or irregular heartbeat with chest pain; or a high fever with any of these. - **Never stop suddenly** after regular use. No exceptions. Milder symptoms (worse anxiety, insomnia, irritability, tremor, sweating) mean the reduction is too fast: call your prescriber or urgent care the same day. Don't wait them out alone. - **Already stopped suddenly?** Go to urgent care or an ED today and say: "I have stopped benzodiazepines abruptly and I am having withdrawal symptoms." They can restart a safe dose and begin a supervised taper. - Crisis: **988** (call or text). SAMHSA **1-800-662-4357**. Text HOME to **741741**.

What these drugs do and why dependence forms

Benzodiazepines amplify GABA, the brain's main calming signal. Anxiety quiets, muscles relax, sleep comes. The brain adapts by turning down its own GABA receptors. That is tolerance and dependence, and it can start within weeks. Remove the drug and the brakes are below baseline while the accelerator runs unchecked. **[Established]**

Z-drugs (zolpidem, eszopiclone, zaleplon) act on the same receptor and carry comparable dependence and withdrawal risk despite being marketed as non-addictive. **[Established]** Gabapentinoids work differently (calcium channels) but have a real withdrawal syndrome, including seizure risk when high doses stop abruptly. **[Established]**

Most people reading this did not choose dependence. They took a prescription as directed and their brain adapted. The Kernel calls this the iatrogenic wound: treatment became the harm. You do not need to feel guilty or call yourself an addict if that word does not fit. Anger and betrayal are valid. The anxiety or sleep problem was real before the prescription, and the taper often brings it back, sometimes stronger.

Other effects: benzodiazepines blunt memory encoding and can cause a “benzo fog” (slower thinking, poorer memory, word-finding trouble). They also suppress REM and deep sleep, so sleep that felt longer was thinner. The stress system rebounds on withdrawal.

Danger points

- **Abrupt stop:** seizure risk after daily use for more than a few weeks. Highest risk: daily use over four weeks; high doses; mixing with alcohol, opioids or GHB; any past seizure; a bad past attempt to cut down; a known GABRA2/GABRB3 high-risk variant [Kernel hypothesis].
- **Mixing:** alcohol, opioids or GHB with a benzodiazepine raises overdose risk. Alcohol during withdrawal is the Kernel’s “hard fail” for high-risk GABRA2 carriers [Kernel hypothesis].
- **Counterfeit pills:** a pill that looks like Xanax may contain fentanyl, a nitazene, or no benzodiazepine at all. Appearance proves nothing. Fentanyl test strips do not reliably detect nitazenes. **Naloxone does not reverse a benzodiazepine overdose**, but keep it available because opioids may be present, and nitazene overdoses may need repeated doses. Call 911.
- **“Research chemical” benzodiazepines (e.g. etizolam)** are not a safe workaround: same receptor, same dependence and seizure risk, unreliable dosing, and routine hospital drug screens often miss them. If you need care, say exactly what you took. A negative screen is not reassurance.
- **Sodium oxybate or GHB** in the picture is a separate, faster emergency. See the GHB chapter.
- **Tolerance after a break:** a lost supply or custody lowers tolerance. A previous dose can become dangerous. A break is not a reset.
- **Drug interactions:** some medicines (certain antifungals, antibiotics, grapefruit) can raise levels and others (some anti-seizure drugs, St. John’s wort) can lower them and cause breakthrough withdrawal. Tell every prescriber and pharmacist everything you take.

Getting safe: the medical picture

The taper is the medicine. Supplements, breathing and exercise make it more bearable. They never replace a slow, supervised taper. No taper schedule, dose, or “equivalent” conversion is given here. Your prescriber decides.

Principles that match the 2025 joint clinical practice guideline on benzodiazepine tapering: - Do not stop abruptly in anyone likely to be dependent. - The pace is **slow, individualized and prescriber-led**; you can pause when symptoms are unmanageable, and the end of a taper is often the hardest part. - A taper can take months to years after long-term use. The body sets the pace, not the calendar. - **Whether to switch to a longer-acting benzodiazepine first (a cross-taper) is the prescriber’s choice.** It is an option, not a requirement. Some prescribers do it; some taper the original drug. - Liver-enzyme genes (especially

CYP2C19) and interacting drugs can change how a switch behaves. Ask your prescriber whether testing is worthwhile. **[Emerging]**

How to ask for a taper: - Say plainly: "I have developed physical dependence and would like a supervised taper." - Keep a written record of doses, symptoms and conversations. - If a prescriber denies dependence from prescribed use or refuses to help, you have a right to a second opinion from an addiction medicine specialist or a psychiatrist with taper experience. - Peer resources (the Benzodiazepine Information Coalition, Benzo Buddies) exist because the system has failed many people. They offer support, not medical care.

Non-benzodiazepine medicines are the prescriber's decision. Options the Kernel lists: buspirone (slow-acting, non-addictive), SSRIs/SNRIs for an underlying anxiety disorder, hydroxyzine for short bridging, propranolol for physical symptoms.

Gabapentinoid bridges: a specialist decision. The Kernel's sources disagree. Some use gabapentin or pregabalin as a short-term bridge; others warn that a bridge can swap one dependence for another. Neither is a default. If one is offered, ask for a written review date, whether it is a short bridge or maintenance, and what stopping it will involve. An open-ended substitute is the same pattern with a different molecule.

If the supply was cut off by someone else's decision

Prescriber-imposed rapid taper, hospital admission that drops the drug, insurance or pharmacy denial, running out, a move or prescriber leaving, or arrest and custody: **the biology does not care whose decision it was.** The single most useful move is to convert a forced, abrupt stop into a **supervised** taper.

Situation	What to do
Prescriber imposes a fast taper	Ask for a slower, individualized plan; if refused, ask for a referral to an addiction medicine specialist or psychiatrist with taper experience
Hospital or facility stops the drug	Tell the team, in writing if possible, that you are physically dependent and need continuation or a supervised bridge; ask for psychiatric consult if withdrawal starts
Insurance or pharmacy denial	Call the prescriber the same day; ask the pharmacy about emergency dispensing; if the gap can't be closed, seek urgent care early
Arrest or custody	Declare the dependency at intake and repeat it to each new staff member. Concealing it is the dangerous instinct. On release, tolerance is gone: seek medical care and do not resume a previous dose

Situation	What to do
Already stopped, no medical contact	Go to urgent care or an ED today. Do not try to restart leftover pills on your own
Substitute offered with no exit plan	Ask the review-date questions above and get the answer in the chart

Common reasons prescribers cut people off, so you can name what happened rather than guess: use patterns (early refills, several prescribers or pharmacies, failed pill counts, mixing with alcohol or other depressants, sharing pills, an ER visit); system factors (dose caps, regulatory scrutiny of a practice, policy or telehealth rule changes); and life events (a prescriber retiring, job or insurance loss, moving). Recognizing your pattern is information, not a verdict. Sharing pills, or building a spare supply by stacking prescriptions in a household, raises your real exposure. Tell your clinician the whole picture. Hiding it increases your medical risk.

Risk screen. Clinicians weigh: daily use over four weeks, high dose, any past seizure (the heaviest factor), alcohol/opioid/GHB co-use, a hard earlier attempt to stop, family seizure history, pregnancy, heart conditions, age over 65. A high-risk picture is an emergency- department situation.

While you are reaching a prescriber, the Kernel offers non-drug support underneath medical care (never instead of it): fluids and electrolytes, slow extended-exhale breathing, sensory grounding, and contact with one person who knows. Ask a clinician before adding any supplement, because some sedating herbs and high-dose amino acids add to a benzodiazepine's effect.

The first weeks: what to expect

- **During a taper:** each reduction may bring one to two weeks of more anxiety, poor sleep or physical symptoms before settling. That is expected; severe or persistent symptoms mean call your prescriber about the pace.
- **Weeks after the last dose:** the most sensitive period: peak anxiety, insomnia, muscle tension, ringing in the ears, light and sound sensitivity, fog, emotional swings, sometimes depersonalization.
- **Months 1 to 3:** progressive improvement with setbacks.
- **Months 3 to 18 or more (protracted withdrawal, "windows and waves"):** episodic anxiety, thinking difficulty, tinnitus, visual disturbances or flatness that come and go. Widely reported; frequency and duration are debated. **[Emerging]** It is not proof you need the medicine permanently. The most common and costly reaction is to restart the drug. Call your prescriber instead, especially for anything neurological you have not had before.
- **"Craving" is usually anxiety.** Insomnia at 3 a.m. or an unbearable spike makes a pill feel logical. The interrupt: name it ("a wave"), slow breathing with a long exhale, five-senses grounding, contact (your

prescriber if new or severe; a support person; 988 if in crisis), then write down trigger, intensity and what helped.

- **Highest-risk situations:** a major stress event; waves; sleep loss; leftover pills or an old prescription still on file (ask your prescriber how to handle it); new prescribers who don't know your history. Tell every prescriber.
- **If the supply stops, what not to do:** alcohol (same receptor); cannabis (can mask early warning signs of seizure risk); kratom; sedating over-the-counter antihistamines; and above all pills from someone else or the internet.
- **Sleep and fog:** rebound insomnia after the last dose is the brain reclaiming REM sleep. Most fog improves within 3 to 12 months. Daily aerobic exercise and learning something hard are the best-supported helpers. **[Emerging]**

Rebuilding: natural architecture and treating what it was treating

The point: build skills **during** the taper, not after. Someone who reaches the last dose with months of daily breathwork behind them is in a different position.

- **Anxiety skills:** extended-exhale breathing, mindfulness-based stress reduction, exposure-based CBT (often started a few months in, when thinking has cleared), non- sleep deep rest, brief cold water on the face for a panic spike.
- **Natural calm:** meditation that builds over months; sustained aerobic exercise; gentle yoga; time in nature; creative absorption. Some claims, such as meditation or yoga "raising GABA," rest on small or animal studies. **[Emerging]**
- **Treat the original condition.** Panic, generalized anxiety, trauma and insomnia deserve real treatment. Clinician-led CBT or MBSR, and non-addictive medicines if needed, keep the anxiety from rebuilding the case for the pill.
- **Nutrition and supplements:** **[Emerging]**. Methylated folate and B vitamins, magnesium, and calming amino acids are discussed in the Kernel. Dose with your prescriber/pharmacist; add one at a time; watch for extra sedation; check interactions. Peptides are research compounds; physician-only.
- **Identity:** "I was a medicated person who did everything right and still got trapped." Grieve that. Then rebuild a picture of yourself as someone with a sensitive nervous system who needs appropriate support, not lifelong medication by default.
- **Before any future prescription,** ask: "What is my exit strategy?"

Genetics and tests

[Kernel hypothesis] unless noted. **Never delay a taper or emergency care for test results.**

Marker	Kernel hypothesis
GABRA2	Thinner baseline brake; slower recovery; more severe protracted symptoms; highest seizure risk
GABRB3	Seizure threshold; tell every medical team
CYP2C19	Affects how diazepam builds up; poor metabolizers may over-sedate. Relevant to cross-taper decisions **[Emerging]**
CYP3A4 Marker	Affects most short-acting benzodiazepines; interacting drugs matter [Established for interactions] Kernel hypothesis
COMT Met/Met, MTHFR, SLC6A4, BDNF	Anxiety load, methylation and SSRI non-response, anxiety sensitivity, cognitive repair speed

No test? Ask yourself: did these drugs hit unusually hard at standard doses? Wear off faster than expected? Has the anxiety always been there? Did antidepressants fail? Share with your prescriber.

Milestones

Kernel projections, not trial results. The case-study figures (for example 65% completing a taper without ER or seizure at 12 months, vs 15% unsupported) describe a supervised, adherent archetype. A seizure history is a clinical finding. The Kernel's inference from it to a genotype is "consistent with," not proof.

When	Focus
Days 0 to 14	Supervised taper arranged, or forced stop converted to supervised. No alcohol/opioids/GHB.
0 to 3 months	Taper in progress; breathing, exercise, sleep habits; waves understood; old supply handled
3 to 12 months	Protracted waves thinning; fog lifting; CBT/MBSR habits; sleep recovering
Year 1 to 2	Anxiety managed by natural means plus clinician care; GABA system largely recovered in most long-term users [Kernel projection]
Year 3	Taper closed out, waves watched; maintenance supports
Year 5	Triggers are stress and sleep loss; peer support and advocacy

When	Focus
Year 10	"What is my exit strategy?" before any new prescription; a new benzodiazepine course means the supervised-taper rule applies again

FOR CLINICIANS

- Follow current joint-guideline principles: individualized, gradual, patient-involved; do not stop abruptly; hold or slow for intolerable symptoms.
- Cross-taper to a long-acting agent is optional; consider half-life, CYP2C19/CYP3A4 and interacting drugs.
- Screen for co-use (alcohol, opioids, GHB), seizure history, counterfeit pills. Standard immunoassays miss many designer benzodiazepines.
- Believe iatrogenic dependence. Document. Offer a hold at difficult steps. Gabapentinoid or other substitutes: a written review date and exit plan.
- Treat the underlying anxiety or insomnia as a condition in its own right.

For families and supporters

- Do not pressure anyone to stop abruptly or "just quit." Help them reach a prescriber.
- Know the emergency signs and call 911 for a seizure or confusion.
- Anxiety waves are not manipulation or relapse. Stay with them.
- Hand-off advocacy matters: help call pharmacies, document dates, attend appointments.
- If someone is arrested on these drugs, tell the facility's medical unit about the dependence.

KEY POINTS

- Never stop benzodiazepines, Z-drugs or high-dose gabapentinoids suddenly.
- The taper is the medicine: slow, individualized, prescriber-led.
- If a supply is cut off, convert the forced stop into a supervised one.
- Protracted waves are not a reason to restart; call the prescriber.
- Street pills may contain fentanyl or nitazenes. Naloxone does not reverse benzodiazepines.
- Bridge or substitute medicines need a review date and exit plan. Gabapentinoid bridges are a specialist decision.

GHB, GBL and 1,4-butanediol

> **In this chapter.** For people using GHB, GBL or 1,4-BD, and people prescribed sodium oxybate (Xyrem, Lumryz) who want to reduce or stop. The biology is the same across all four. Medical urgency depends on how often you dose. This is the fastest and one of the most dangerous withdrawals in the library and has the longest recovery. No dosing or detox protocol is given. US-centred. See the Handbook chapter "The 12 Safety Rules."

EMERGENCY BOX - **Overdose:** cannot be roused, slow or stopped breathing, blue or gray lips, vomiting while unconscious, seizure. **Call 911.** Place the person on their side and stay. **There is no antidote and naloxone does not work.** Do not wait to see if they wake. - **Withdrawal (go to an ER now):** any seizure; confusion, disorientation or hallucinations; extreme agitation with a racing heart, high blood pressure or heavy sweating; worsening tremor. - **If you dose more than three or four times a day, or overnight to prevent withdrawal, do not stop on your own.** Go to an emergency department. - Poison Control **1-800-222-1222**. Crisis: **988**. SAMHSA **1-800-662-4357**. Text HOME to **741741**.

What it does and why it hooks people

GHB (gamma-hydroxybutyrate) occurs naturally in tiny amounts in the brain. At recreational doses it acts mainly on GABA-B receptors, and also on its own receptors that influence dopamine. **[Established]** The experience can be calm, sociable, sleepy or euphoric. GBL and 1,4- BD are industrial chemicals the body converts to GHB, GBL faster and more potent, 1,4-BD more slowly through the same liver enzymes as alcohol. Sodium oxybate is pharmaceutical GHB for narcolepsy; dependence there is a consequence of treatment, not a moral failing.

Why dependence is fast. GHB leaves the body in 1 to 2 hours. A person dosing every few hours trains the brain to expect it on that schedule, so the receptors turn down. They wake through the night to dose. Withdrawal starts within hours of a missed dose. **[Established]**

Why people use it (and what recovery must address): - *Nightlife or chemsex:* disinhibition and belonging, often with stimulants. - *Anxiety or sleep self-treatment:* fast, complete quiet. Anxiety was there before and needs a real answer. - *Athletic use:* sold for growth hormone and recovery. Nightly use is how dependence forms unnoticed. - *Narcolepsy:* a neurologist decides any change; symptoms return when it stops. - *Alcohol substitute:* two GABA-type dependences may coexist. - *Livestreaming:* an audience adds a reward and gives a false sense of safety. Viewers cannot do what a person in the room can.

Danger points

- **Overdose margin is narrow.** The dose that sedates and the dose that kills are close. Sedation, unconsciousness and respiratory failure can follow each other within minutes. Street GHB has no standard concentration; the same volume may hold very different doses. GBL is faster and more potent. **[Established]**
- **Mixing.** With alcohol, benzodiazepines, opioids, ketamine, sedating antihistamines or other depressants the effect is synergistic and can kill at doses that would be survivable alone. Never combine. For high-risk GABRA2 carriers the Kernel calls alcohol plus GABAergic drugs a "hard fail" **[Kernel hypothesis]**.
- **Using alone.** If a venue, friend group or community excludes you, use often moves home. Then nobody can recognize an overdose and call 911.
- **A large supply within reach** makes impulsive extra doses easier, and concentration may differ from first measure to last. Reduce the supply you hold.
- **Withdrawal.** In dependent use, it can start within 2 to 6 hours of the last dose. The peak-danger window runs roughly from 12 to 72 hours, with seizure risk and a severe delirium (agitation, confusion, hallucinations, unstable heart rate, blood pressure and sweating) distinct from ordinary anxiety. Severity doesn't track neatly with what people report, and under-reporting leads to under-treatment. **[Established]**
- **Tolerance after a break** falls; a past dose can overdose you.
- **Lapse:** an overdose-risk event with no antidote. Do not use alone; call 911 for unresponsiveness; if you return to dependent-level use, go back to supervised detox rather than stopping on your own.

Getting safe: the medical picture

How dependent are you? (The Kernel's five levels.)

Level	Pattern	What stopping needs
1 to 2	Rare or occasional, not escalating	Usually can stop without medical care. Watch for shrinking gaps or creeping amounts
3	Roughly weekly, stable, no discomfort between uses	Very likely safe without inpatient detox. Talk to a physician the same day to rule out dependence you haven't noticed
4	Escalating, or any discomfort between doses	Physician involvement **before** stopping is a safety requirement

Level	Pattern	What stopping needs
5	Three or more doses daily, including overnight	**Supervised detox only**, in an emergency department or inpatient unit

Answer honestly: dose more than three times a day? Shake, sweat or panic when you miss a dose? Ever had a seizure, confusion or hallucinations when going without? Dose every couple of hours or overnight? Regular alcohol or benzodiazepine use alongside? Any yes means medical detox, not self-management.

Who supervises. An emergency department or inpatient addiction unit. There is no FDA- approved treatment specific to GHB withdrawal, and many physicians have limited experience. Options clinicians use include baclofen (acts on the same receptor and the best-supported option **[Emerging]**), benzodiazepine-based protocols (what most emergency departments use), specialist use of phenobarbital or pharmaceutical sodium oxybate, and supportive treatment for delirium and unstable vital signs. Knowing this lets you or a supporter advocate. No self- administered protocol is given here. Do not add supplements during a baclofen or benzodiazepine taper without your physician; some herbs and high-dose amino acids add sedation.

If a hospital is out of reach (distance, cost, immigration status, local limits): Poison Control and telehealth exist for this gap. A sober person physically present is the minimum safeguard. Act **before** use reaches the dependent level, when supervised reduction is still possible. This is a failure of systems, not of you. **The 30-day cliff.** A common pattern is about five days inpatient, then roughly 30 days of benzodiazepines as a bridge. When it ends on a calendar date, with no taper and no follow-up, relapse is documented and common. The recovering GABA-B system is months from healthy. Before you leave: book an outpatient appointment dated **before** the supply runs out, and ask for a taper coordinated with an addiction medicine or psychiatric provider, not a hard stop.

A second dependence. Post-GHB anxiety is often read as a new anxiety disorder, followed by an open-ended benzodiazepine, which can mean a longer dependence than the first. Tell every prescriber about the recent GHB history and timeline. Ask that anything prescribed be a time- limited bridge with a stated review date. For persistent anxiety, ask about non-addictive options such as buspirone.

Sodium oxybate prescribed for narcolepsy: involve your neurologist before any change. Alternatives should be optimized first. **Also drinking, or using benzodiazepines:** assess all dependencies together before reducing any (see the other chapters). **Chemsex:** see the Chemsex chapter.

The first weeks: what to expect

When	What to expect
Hours 2 to 6 after last dose	Anxiety, tremor, sweating, racing heart, nausea; can look like ordinary anxiety until it escalates
Roughly hours 12 to 72	Peak danger: seizure, delirium, autonomic instability. Monitored care only
Days 3 to 7	Confusion clears; fatigue, low mood, insomnia emerge. No sudden reduction of any bridge medicine
Weeks 1 to 4	Anxiety (often severe in weeks 1 to 2), poor sleep, fog, cravings
Months 1 to 6	Central restoration phase; waves decrease in frequency and intensity
Months 6 to 18+	Receptor recovery largely complete in most; cravings mostly contextual [Kernel projection]

- **This is the longest timeline in the library.** The Kernel puts the central recovery at about 3 to 6 months and substantial recovery at 12 to 18 months or more. Expecting 4 to 8 weeks leads people to conclude, wrongly, that recovery has failed. [Kernel projection]
- **Four kinds of craving:** *anxiety-driven* (a body-level alarm that feels like early withdrawal); *sleep-context* (waking two to three hours after falling asleep, the old dosing time); *social or chemsex cues*; and *flatness* (GHB remembered as making everything vivid). The first is the recovering brain oscillating, but **hallucinations, severe confusion or a seizure at any time are a medical emergency, not "PAWS."**
- **Night waking** at old dosing times can last weeks or months. Do not dose. Slow breathing; return to sleep.
- **Disorientation:** if the drug organized your day, removing it can leave you disoriented about time and identity as well as withdrawn. It is normal.
- **Interrupt a craving:** name the type; slow extended-exhale breathing; change location (leave the cue environment first); contact someone; use a natural calming input (cold water on the face, gentle movement, slow music); write down trigger and result.
- **Cues:** reduce what is within reach and clear apps, chats and groups as thoroughly as physical cues.

Rebuilding: natural architecture and treating what it was treating

GHB delivered a nervous system that would completely stop. The Kernel's premise is that a rebuilt version of this state is reachable through your own systems and is more sustainable, because it doesn't downregulate. [Kernel hypothesis] - **Daily practice:** slow extended-exhale breathing until it is automatic, like the old dosing schedule; cold water; aerobic exercise; yoga and non-sleep deep rest; meditation (builds over months); nature; calm music; absorbing creative work. Consistency beats intensity. Do not taper off supports early. Build exercise up gradually, keep hard workouts out of the evening, and avoid overtraining in the early weeks. - **Treat what it was treating:** sleep problems, anxiety, depression or trauma get clinician care. For high-frequency users, expect to rebuild the structure of the day. - **Chemsex:** each substance needs its own recovery track. HIV/STI testing, PrEP review and building a sober community are clinical priorities. Sexual shame or anxiety often needs specific therapy. See the Chemsex chapter. - **Athletic use:** replace the effect with strength training, good sleep and nutrition. - **Nutrition and supplements:** [Emerging]. Only once a physician confirms you are medically stable. Methylated B vitamins, magnesium and calming amino acids appear in the Kernel's plan. Dose with your clinician/pharmacist, check interactions with baclofen or benzodiazepines, and tell every prescriber what you take. Peptides are research compounds; physician only. No dopamine-raising supplements (tyrosine, rhodiola) while psychotic symptoms are active; wait for psychiatric clearance. 5-HTP only on physician advice and never with serotonergic drugs. - **Identity and meaning:** structured inventory work and amends to yourself come later; family, money and work follow.

Genetics and tests

All [Kernel hypothesis] unless stated. **Never delay detox for results.**

Marker	Kernel hypothesis
GABRA2	Thinner baseline brake; harder dependence, withdrawal and post-acute symptoms
GABBR1/GABBR2	Genes for the receptor GHB acts on; clinical testing is limited [Emerging]
COMT Met/Met vs Val/Val Marker	Why you used: calm-seeking vs stimulation- Kernel hypothesis seeking; it shapes long-term recovery, not whether detox works
CYP2C19, CYP3A4	How baclofen and benzodiazepines are processed. Give known results to your detox physician [Emerging]
ADH1B, ALDH2	Relevant for 1,4-BD users; liver tests are a priority

Milestones

Kernel projections. The Kernel's 12-month case figures (for example 63% GHB cessation with full support vs 20% standard) are archetype projections, not trial results, and describe a frequent user, not a round-the-clock dependent one.

When	Focus
Days 0 to 7	Monitored detox if dependent; never alone; plan for day 30
0 to 3 months	Cross the 30-day cliff with a taper and booked follow-up; cue clearing; sleep; anxiety waves
3 to 12 months	Central restoration; keep supports; identity and context work
Year 1 to 2	Receptor recovery largely complete; cravings contextual
Year 3	Bridge medicines closed out by taper; stack to upkeep
Year 5	Triggers are social contexts (parties, festivals, sex); mentoring
Year 10	No mixing and no stockpile, permanently. Tell every prescriber

FOR CLINICIANS

- Triage by pattern. Overnight dosing or three or more daily doses means inpatient care. Onset can be within hours; withdrawal delirium is distinct from alcohol DTs.
- Management options include baclofen, high-dose benzodiazepines, phenobarbital or sodium oxybate taper in specialist settings; consult addiction medicine or toxicology.
- Plan the discharge: dated follow-up before any bridge ends, and a taper, not a calendar stop.
- Ask for a full history including form, precursor, frequency and nocturnal dosing. Under-reporting causes under-treatment. Document GHB history so later anxiety isn't treated as a new disorder with open-ended benzodiazepines.
- Narcolepsy patients: neurologist-led plan.

For families and supporters

- Learn the overdose signs. For unresponsiveness: **911**, recovery position, stay. No antidote.

- Never let someone with heavy GHB use stop alone. Go to the ER with them.
- Don’t leave them alone for the first days.
- Help remove stockpiles and unlabeled bottles.
- Expect a long road: months of waves are normal.

KEY POINTS

- Dependent withdrawal is an emergency; never stop suddenly or alone.
- No antidote for overdose; naloxone does not work; never mix with alcohol or other depressants.
- Concentration is unpredictable; large supplies and using alone raise the danger.
- Plan for the 30-day cliff: booked follow-up, taper not hard stop.
- Expect 12 to 18 months or more for full recovery; waves are not failure.
- A lapse is an overdose-risk event: don’t use alone.

OPIOIDS

Opioids: Heroin, Prescription Opioids, and Medication for Opioid Use Disorder

> **In this chapter.** What opioids do, why they are so hard to leave, and how people recover, with medication (MOUD, also called MAT) as the foundation rather than a compromise. The single most important fact: withdrawal rarely kills, but returning to an old amount after a break in use often does. This chapter covers heroin, prescription opioids (oxycodone, hydrocodone, morphine, codeine, tramadol, methadone and others) and the medicines that treat dependence. Fentanyl and the unknown supply are in the next chapter. Kratom and 7-OH follow after that. Content is US-centred.

EMERGENCY BOX: call 911 now and give naloxone if: - the person cannot be woken, or does not respond to voice or a firm sternum rub - breathing is slow, shallow, gurgling or snoring, or has stopped - lips or fingertips are blue or gray, or pupils are pinpoint

Call first, give naloxone (nasal spray or injection), roll the person onto their side, breathe for them if trained, and **stay**. Naloxone can wear off before the opioid does, so the person can stop breathing again. Never leave them alone, and let paramedics assess them even if they wake. If the person is in despair or talking about suicide: call or text **988**. Poison Control: **1-800-222-1222**. SAMHSA Helpline (treatment referral, 24/7): **1-800-662-4357**. Never Use Alone line (a person stays on the phone and sends help to you): **1-800-484-3731**. Crisis Text Line: text HOME to 741741. Most US states have Good Samaritan laws that protect people who call for help; check yours.

The shared rules (naloxone, never use alone, nothing unverified is safe, a break is not a reset) are set out in the Handbook chapter “The 12 Safety Rules”. They are repeated here only where they decide whether someone lives.

1. What opioids do and why they hook people

Your brain has its own opioids, the endorphins. They are released by exertion, touch, laughter, music, safety and belonging. They are the chemistry of comfort, pain relief and feeling at home in your body. Opioid drugs switch on the same receptors far harder than anything the body can do.

What repeated use does [Established] - The brain cuts its own endorphin output and reduces receptor sensitivity. Natural comfort goes quiet. - The stress system is held down while the drug is present, then

rebounds hard when it leaves. This rebound is much of what withdrawal feels like. - The reward system is secondarily blunted, so food, music and people can feel flat. - Pain sensitivity can rise (opioid-induced hyperalgesia), so everything hurts more at first. - Sleep is distorted. Opioid sleep is sedation, not restorative sleep.

Why the drug often felt necessary. The Kernel's idea of *signal, not sin* applies here: the preference was a report about something real. Common things opioids were treating: - chronic or poorly treated pain (the habit often began as legitimate treatment) - trauma and adverse childhood experiences - loneliness, grief and a lack of warmth or belonging - untreated depression, anxiety, PTSD or ADHD

Knowing which applies does not excuse harm. It tells you what else must be treated, or the pull back stays biological and not just habit.

The opioid family at a glance

Opioid	Notes for recovery
Heroin	Street heroin is now often mixed with or replaced by fentanyl. Treat it as fentanyl for planning (see next chapter).
Oxycodone, hydrocodone, morphine Opioid	Many people began with a legitimate prescription. The receptor biology is the same as with street use, but the shame is different ("I was only taking my medication"), Notes for recovery and it needs its own conversation. Extended-release forms bring harder, longer withdrawal.
Codeine, tramadol	Often wrongly seen as mild. Tramadol also acts on serotonin and noradrenaline, so its withdrawal is more complex, and seizures are possible, especially after abrupt stopping from high use. How well these drugs work depends on a liver enzyme (CYP2D6); see section 7.
Methadone	Very long-acting. Withdrawal starts late and can last weeks. Never stop abruptly outside medical supervision.
Kratom, 7-OH	Act on the same receptor. See the kratom chapter.

2. Danger points

1.**Lost tolerance.** After days or weeks without opioids (treatment, hospital, jail, a supervised break, or simply running out), tolerance falls. The old amount now acts like a first-ever dose. This is the most common way opioid recovery ends in death, and it applies at 3 days as much as at 3 years. Philip Seymour

Hoffman, 23 years in recovery, died at 46. The Kernel uses his case to make one point: the risk never reaches zero. **A break is not a reset.** 2.**A change in supply.** Anything unverified may contain fentanyl or other potent drugs, whatever it is sold as. See the next chapter. 3.**Mixing.** Opioids plus alcohol, benzodiazepines, sleeping pills, gabapentinoids or other sedatives multiply the risk of stopped breathing. 4.**Using alone.** Nobody can give naloxone or call 911. 5.**Gaps in medication.** Missing buprenorphine or methadone, through a lost prescription, a pharmacy problem or a missed appointment, is a high-risk period. Plan backup before you need it. 6.**Pain events.** Surgery, dental work, injury and flares are common relapse triggers. Make a pain plan beforehand and put your history on record. 7.**Grief, celebration and "special occasions."** Both loss and good news can fire an old association. 8.**Combined withdrawal.** If you also use alcohol or benzodiazepines, do not stop either suddenly. Their withdrawal can cause fatal seizures and needs medical supervision. An opioid detox that ignores them is not safe. 9.**Injecting.** Infection risks (hepatitis C and B, HIV, skin infections, heart-valve infection). Get tested. Hepatitis C is curable. Fever, a new heart murmur or unexplained exhaustion after injecting needs urgent medical care. 10.**Opioid-like effects of gabapentinoid or other "bridge" drugs.** Gabapentin and pregabalin can help with nerve pain, but they carry their own dependence and withdrawal risks. If one is offered, ask for a review date and an exit plan.

Naloxone basics - Get it before you need it. In most US states it is available without a prescription, often free from harm-reduction programs. Keep it where others can find it, and teach the people at home. - Nasal and injectable forms exist. Follow the package instructions; if there is no response after a few minutes, give another dose. Stronger opioids can need more than one. - Naloxone does nothing if opioids are not involved, so it is safe to give when unsure.

3. Getting safe: the medical picture

Medication is the foundation

For opioid use disorder, medication has the strongest evidence of any addiction treatment **[Established]**. It cuts overdose deaths (published estimates cluster near one half, not the 50 to 70 percent that earlier Kernel text stated) and helps people stay in treatment. The Kernel's position: someone stable on medication who is functioning and connected is in genuine recovery. "It's still drugs" has cost lives.

Medicine	What it is	Main points
Buprenorphine (daily film or tablet; Sublocade monthly injection; Brixadi weekly or monthly injection)	Partial opioid agonist with a ceiling effect	First-line for most people. Any DEA-registered prescriber can prescribe it, including primary care, emergency departments and telehealth. It also relieves pain. Started too early after other opioids it can trigger sudden withdrawal, so timing and method are the prescriber's job. *Correction: an older Kernel reference to a six-month implant is out of date. The implant was discontinued; Brixadi is an injection.*
Methadone Medicine	Long-acting full agonist What it is	Dispensed through licensed opioid treatment programs. Strong evidence, especially Main points for severe or long-standing use. Needs a heart-rhythm check (ECG). Many drug interactions.
Extended-release naltrexone (monthly injection)	Opioid blocker	Needs a full opioid-free period first, otherwise it triggers severe withdrawal. That gap is itself a high-risk time. Works best with strong support.

- **Duration is a clinical decision, not a date.** Stopping early raises relapse and overdose risk. The goal is not zero medication; the goal is stability.
- Withdrawal-comfort medicines (such as clonidine, lofexidine, anti-nausea and anti- diarrhoea drugs, anti-inflammatories, hydroxyzine) are prescriber decisions. **Loperamide in high doses has been misused and can cause fatal heart rhythm problems.** Use it only as directed.
- Medication interactions matter. Many drugs affect how methadone, buprenorphine and fentanyl-type opioids are cleared (see section 7). Tell every prescriber and your pharmacist everything you take, including supplements.

Withdrawal in brief

- Onset roughly 6 to 24 hours after short-acting opioids, later for methadone. Peak physical symptoms in the first days: aches, sweating, chills, nausea, diarrhoea, insomnia, anxiety.
- Physical symptoms usually ease over about 1 to 2 weeks. Low mood, flat feelings and cravings can peak later.

- Withdrawal is miserable and rarely fatal by itself. Its danger is the return to use at zero tolerance. That is why supervision and medication exist: to make it bearable enough that you do not go back.
- If you take a prescription opioid and want to come off it, taper with your prescriber. Do not stop abruptly. The pace and method depend on the drug (patch, extended-release, short-acting) and are a specialist decision.
- A time-locked medication box held by a trusted person can help with a supervised taper by adding friction against impulsive early doses. It supports the medical plan; it does not replace it. Know who controls the emergency override.

Why "just getting by" with unverified supply is its own danger

A pharmacy medicine has a documented chain of custody. A street or online substance has none. Bridging a gap in a taper with whatever is available is a decision made with no information about what you are taking. If your medication supply is at risk, call your prescriber or SAMHSA (1-800-662-4357) *before* you run out.

4. The first weeks: what to expect

Window	What is happening	What helps
Days 0 to 14	Withdrawal or medication start. Highest risk of return to detox. Naloxone in the home. use.	Medication or supervised Company. Never alone.
Days 3 to 10	Physical symptoms fade. Low mood and anhedonia (nothing feels good) can peak. Sleep is poor.	Walking and any movement. Regular meals. Contact with people. Treat sleep as seriously as cravings: poor sleep is one of the strongest predictors of early relapse.
Weeks 1 to 4	Uneven improvement. Waves Daily routine, recovery of anxiety, flatness or craving with no clear trigger.	community, honest contact with your prescriber.
Months 1 to 6	Receptors and endorphin systems recover. Pain sensitivity settles. Moments of real pleasure return.	This is where recovery becomes sustainable, not just survival.
Months 6 to 18+	Many people report substantial recovery of natural comfort and bonding. Post-acute waves become rare.	Keep the routine. Review medication with your prescriber.

Post-acute withdrawal (PAWS) [Established that it occurs; durations vary]. Waves of anxiety, flat or raw emotions, fog, aches and craving can appear weeks or months after the last use and last hours to days.

Sources inside the Kernel give different ranges (roughly 6 to 18 months, and up to about 24). Treat both as the same message: it can take well over a year, and may run longer after fentanyl. A wave is not failure and not relapse. It is a brain recalibrating. Name it ("this is a post-acute wave; I have not used"), contact someone, and let a log of episodes show you the pattern.

The 5-minute craving interrupt. Cravings usually peak and pass in about 20 to 30 minutes. 1. Name the type: pain or loneliness, flatness or boredom, or a cue (a person, place or object tied to use). 2. Slow breathing for a few minutes. 3. Leave the cue. Do not negotiate with it. 4. Contact someone: your prescriber, sponsor, a friend, or 988. 5. Do something that raises your own endorphins: hard exercise, cold water, safe touch, laughter, loud music. 6. If you are on medication, remember that the craving is not proof it has failed. 7. Write down trigger, intensity, action and result. **Cue-triggered craving** is a conditioned reflex, not weakness. Seeing the spoon, the house, the contact in your phone can fire a full craving with no decision at all. The fix is environmental. Delete numbers and apps, change routes, and put distance between you and the cues.

Return to use. A lapse is information and a medical risk. If it happens: do not use alone, keep naloxone in reach, assume tolerance is lower than you think, contact your prescriber, and ask someone to stay with you. Then look at what led to it without shame.

5. Rebuilding: natural architecture and treating what it was treating

The target is endorphins, not dopamine. Opioid recovery rebuilds comfort, connection and pain tolerance. Receptors take months to recover, so everything may hurt more and feel flatter at first. For a heavily affected system, plan for timelines two to three times the standard ones **[Kernel hypothesis]**.

Source	How
Vigorous exercise	The primary endorphin source. Start where you are, even a short walk, and build.
Safe human contact	Recovery groups (NA, SMART, peer support), safe touch, time with trusted people. Not a luxury: it is the chemistry opioids imitated.
Laughter	Shared and scheduled, not just screens.
Music	Slow, warm music helps early on; music that matches grief is allowed.
Cold exposure	Cold showers, built up gradually.
Service and mastery	Helping others in recovery is often named as the most lasting source. Physical skills restore a sense of bodily agency.

Treat what the opioid was treating - **Pain.** Removing the opioid without a pain plan is suffering without strategy. It is the most predictable road back. With a clinician who understands both addiction and pain, consider: physical therapy, exercise, non-opioid medicines (some carry their own misuse risk), nerve-targeted treatments, mindfulness-based pain programs, heat and cold, acupuncture, and buprenorphine itself, which is an effective pain medicine. Find out why the pain exists if no one has diagnosed it. - **Trauma.** Stabilise first (medication, sleep, housing, supports), then begin trauma therapy. Starting too early can destabilise recovery. See the chapter on complex trauma. - **Depression, anxiety, ADHD.** Treat as separate medical conditions. Non-stimulant ADHD options are usually preferred; stimulants after opioid use disorder need careful judgment. - **Infections.** Test for hepatitis C, hepatitis B and HIV if you injected. Hepatitis C is curable in most cases. Do not wait for "more stable recovery." - **Sleep, food, movement.** Dull but decisive. Poor sleep drives relapse. **Supplements (all "dose with your clinician and pharmacist").** The Kernel suggests a methylation foundation (methylfolate, B12, B6, magnesium), omega-3, NAC for craving, and DLPA, which slows breakdown of the body's own enkephalins. The honest label for most of this is **[Emerging]** (plausible, limited or mixed evidence); none of it replaces medication. Check every addition with a pharmacist, because some interact with methadone, buprenorphine or other prescriptions. Take **5-HTP only on a physician's advice and never with serotonergic drugs** (tramadol, many antidepressants and others). Peptides (BPC-157, Selank, Semax, Epitalon, TB-500) are research compounds; the Kernel itself says physician discussion only, and they are not a self-start step.

Other emerging ideas, to discuss and not to self-direct - Oxytocin to dampen the stress system: experimental, specialist-only [Kernel hypothesis / Emerging]. - GLP-1 drugs (semaglutide, tirzepatide) as an add-on to medication: early, preliminary data only **[Emerging]**. Not a replacement for MOUD. - Low-dose naltrexone for chronic pain works only when fully opioid- free and not alongside buprenorphine. Prescriber decision.

Context. Opioid recovery is also a social repair job: housing, money, legal trouble, family. See the chapters on incarceration, family, and rebuilding the ledger. The Kernel's *Trinity* (Clarity, Restoration, Manning) applies: understand your mechanism, rebuild your biology, then run a life designed for your wiring, including serving others.

6. Genetics and tests [Kernel hypothesis unless noted]

Never delay medication, naloxone or safety steps waiting for results. Genes refine a plan. They never gate the first steps.

Gene or result	What it may mean
CYP2D6 (liver enzyme)	[Established for codeine and tramadol] **Ultrarapid** metabolisers convert codeine to morphine dangerously fast; deaths are documented. **Poor** metabolisers get little effect from codeine or tramadol, which can drive dose-chasing. Carry your result on a wallet card. *Correction: buprenorphine is cleared mainly by CYP3A4, not CYP2D6.*
CYP3A4 (liver enzyme) Gene or result	**[Established]** Clears fentanyl, oxycodone, methadone and buprenorphine. Inhibitors (some antifungals, antibiotics, many HIV drugs, grapefruit) can raise levels dangerously; inducers (rifampin, carbamazepine, St John's wort) can cause withdrawal or lower medication levels. This is a **medication-interaction** issue first. What it may mean
OPRM1 A118G	**[Emerging]** May relate to how much opioid was needed, and possibly to a stronger response to naltrexone. Evidence is mixed. Raise it with a prescriber; do not choose a treatment on it.
COMT, MTHFR, DRD2, BDNF, GABRA2	**[Kernel hypothesis]** Proposed links to pain sensitivity, mood, reward and the "opioid plus alcohol or benzodiazepine" pattern. Present as hypotheses, not as who you are.

Combined patterns the Kernel describes **[Kernel hypothesis]**: a *metabolic mismatch* (a prescription that does not work for your enzymes, followed by a street supply that bypasses them), a *depleted worrier* (opioids as relief, not euphoria), and an *anxious depressant* pattern (opioids plus alcohol or benzodiazepines). Use them as prompts for questions, not as diagnoses.

If testing is not available, ask yourself: did opioids work unusually well or unusually badly at normal doses? Did other medicines affect them strongly? Do you also use alcohol or benzodiazepines? These are conversation starters for a prescriber.

7. Milestones [Kernel projections]

These are projections, not trial results. Standard timelines in the literature may run 2 to 3 times longer for a heavily affected system.

Window	Focus	What may be true
0 to 3 months	Survive, stabilise	Medication in place or supervised detox. Naloxone at home. Cravings shorten to waves. Sleep and mood begin to settle. Cue removal is the top priority.
3 to 12 months	Rebuild	Endorphin and reward systems recovering. Pain plan working. Trauma therapy if stable. Identity work, inventory and amends begin.
Year 1 to 2 Window	Consolidate Focus	Post-acute waves thin out. Natural comfort and bonding carry more of the load. Medication reviewed with your prescriber, not dropped What may be true by calendar.
Year 3	Review	Medication is a review, not autopilot, but the goal is stability, not zero. Supplements step down to maintenance. Meaning and work move up.
Year 5	Build out	Triggers shift from cues to life events: grief, wins, pain, a gap in supply. Mentoring and service often peak.
Year 10	Stewardship	Naloxone at home, a written relapse plan and the tolerance rule stay for life. Age brings surgery, dental work and new pain: plan before they happen.

The Kernel's archetype projections for two 12-month opioid cases (an adherent plan with medication versus standard care) include, for example, 74% versus 40% retention in medication treatment and 82% versus 55% with no overdose. These are Kernel estimates, not trial data. What changes the outcome: skipping safety steps, running out of medication or stopping it abruptly, untreated pain or trauma, using alone, and unsupervised withdrawal from alcohol or benzodiazepines.

8. For clinicians

- Medication (buprenorphine, methadone, extended-release naltrexone) is first-line; duration should follow clinical stability. Reported overdose-mortality benefit is on the order of one half; avoid overstating.
- Plan induction timing and method with high-affinity or potent exposure in mind (precipitated withdrawal risk). Low-dose induction approaches exist.
- Screen for co-use of alcohol, benzodiazepines and gabapentinoids before any detox; withdrawal from those is medically dangerous. Gabapentinoid “bridges” need an explicit review point.
- Check CYP3A4 inhibitors and inducers against buprenorphine, methadone and fentanyl- type opioids. Check CYP2D6 status before prescribing codeine, tramadol or hydrocodone. Buprenorphine is mainly CYP3A4-cleared.
- ECG for methadone. Offer hepatitis C, B and HIV testing and treatment early.
- Build a pain plan before procedures. Buprenorphine has analgesic effect. Address hyperalgesia and sleep.
- Supplements, peptides, oxytocin, GLP-1 agents and genotype-guided choices are not standard of care; treat as adjuncts at most.
- Counsel on lost tolerance at every transition (discharge, release, missed dosing).

9. For families and supporters

- Keep naloxone at home and in the car. Learn to use it. Practice with a trainer device if available.
- Your job is not to police. It is to keep the person alive, keep contact, and keep the door open.
- The most dangerous times are the first two weeks after any break, such as discharge, release or detox. Be present, help with naloxone, medication and a first-72-hours plan.
- Medication is recovery. Do not shame it.
- Do not hold or hide supplies for them unless the person has asked, and a clinician has agreed, to a structured plan.
- Look after yourself. See the chapter for families and the SAMHSA line.

KEY POINTS

- Withdrawal rarely kills. A return to an old amount after a break often does.
- Carry naloxone, never use alone, and treat anything unverified as dangerous.
- Medication (MOUD) is the foundation. Duration is a clinical decision.
- Do not stop alcohol or benzodiazepines suddenly. Tell your prescriber about every drug.

- Treat the pain, trauma and mood problems the opioid was treating.
- Post-acute waves can last well over a year. They are biology, not failure.

Fentanyl and the Unknown Supply

> **In this chapter.** Why fentanyl changed the risk, what else is in the unregulated supply (xylazine, medetomidine, nitazenes, other potent additives), what naloxone can and cannot do, and how to survive until you are ready to stop. Everything in the opioids chapter applies here: medication, tolerance loss, pain, post-acute waves. This chapter adds only what is different. Content is US-centred, and the supply changes quickly, so this is dated: check local health- department and drug-checking alerts.

EMERGENCY BOX: call 911 first, then give naloxone - Unresponsive, breathing under about one breath every 5 seconds, pinpoint pupils, blue or gray lips (a late sign), gurgling or snoring, or a rigid chest. People can go from alert to unresponsive in under two minutes. - Spend no more than about 15 seconds trying to rouse them. Roll them onto their side. Give naloxone. Breathe for them if trained. If there is no response after 2 to 3 minutes, give another dose (other nostril or a new injection site). Keep going until they breathe or help arrives. Fentanyl often needs more than one dose. - **Naloxone does not reverse xylazine or medetomidine.** If someone stays deeply sedated after naloxone, keep giving it (it still treats the opioid part), keep them on their side, breathe for them if trained, and wait for emergency services. This is a hospital emergency. - **Nitazenes** (see below) may need repeated naloxone doses. - A rigid chest can stop breathing even after some response and needs a hospital. - Never leave a revived person alone. Naloxone wears off in about 30 to 90 minutes, while fentanyl can remain. Stay for at least 90 minutes and let emergency services check them anyway. - 988 (call or text), Poison Control 1-800-222-1222, SAMHSA 1-800- 662-4357, National Drug Helpline 1-844-289-0879 (24/7), Never Use Alone 1-800-484- 3731, Crisis Text Line: text HOME to 741741.

See “The 12 Safety Rules” in the Handbook for the shared rules.

1. What fentanyl does and why the supply is so dangerous

Fentanyl is a laboratory-made opioid about 50 to 100 times as potent as morphine **[Established]**. It reaches the brain faster than heroin or oxycodone, so overdose is faster. It is used safely in hospitals because dose and setting are controlled. The unregulated supply has neither.

The deaths reflect a different supply, not weaker people. Many people never knew what they had.

Why there is no reliable dose - **Hotspots.** Fentanyl is unevenly mixed. One part of a pill or bag can hold many times what the next part holds. “I’ve used this amount from this source before” is not safety information. - **A hit that “didn’t do much”** is not reliable. Redosing to compensate for a “weak batch” is a common cause of overdose. - **Counterfeit pills** made to look like oxycodone, Xanax, Adderall or Percocet can contain only fentanyl, or other potent drugs. There is no safe counterfeit pill. Treat every unverified pill as a potential fentanyl dose. - **Contamination** extends to heroin, cocaine, methamphetamine and MDMA. A stimulant user with no opioid tolerance has no protection at all. - **Supply changes** can happen between purchases, even from the same source.

Current numbers, dated. Earlier Kernel text cited about 110,000 US overdose deaths in 2022 and a DEA figure of “six in ten” counterfeit oxycodone-lookalike pills containing a potentially lethal amount. These are 2022-era figures. National reports since describe a decline in deaths since 2023. Check current CDC and DEA data before quoting any number. The danger has not gone away.

What else may be in the supply (dated; check local alerts)

Additive	What to know
Fentanyl analogs and carfentanil Additive	Even more potent. Fentanyl test strips do not What to know detect them reliably, so a negative strip is not a guarantee.
Xylazine (“tranq”)	A veterinary sedative that is **not an opioid**. Adds deep sedation naloxone cannot reverse. Causes deep, slow-healing skin wounds, sometimes far from any injection site. Any wound that will not heal needs medical care, not a home kit. No antidote; care is supportive (breathing support). Withdrawal needs medical attention.
Medetomidine	A related veterinary sedative that has been replacing xylazine in parts of the US (a federal health advisory was reported in April 2026). Naloxone does not reverse it. It can cause deep sedation and very slow heart rate and low blood pressure. Its **withdrawal can be severe and hospital-level** (agitation, racing heart, high blood pressure). If you use it and want to stop, do not do it alone; go to an emergency department or call SAMHSA. Tell clinicians what you used.
Nitazenes	Very potent synthetic opioids found in counterfeit oxycodone and alprazolam pills. Fentanyl test strips do not reliably detect them. Overdoses may need repeated naloxone doses, and longer observation.
Benzodiazepine-type drugs and other sedatives	Naloxone does not reverse them. They deepen sedation and add a risk of seizure on withdrawal.

Why this matters for naloxone. Always give it for a suspected opioid overdose, since fentanyl is likely present. But if the person is still deeply sedated afterward, naloxone has done its part and breathing support and a hospital are what is left. **Do not wait to see if more naloxone fixes it.**

2. Danger points

- **The two weeks after release, discharge or detox.** The highest-risk window: tolerance is lowest, while craving and supply are both back. After even 3 to 4 days without opioids, tolerance falls significantly. Before leaving any supervised setting: have naloxone in hand, medication arranged (a bridge if possible), housing and a support contact confirmed, and a written plan for the first 72 hours.
- **After any break, or a change in supply:** assume your tolerance is gone. A break is not a reset.
- **Using alone.** Never. Use a buddy or the Never Use Alone line.
- **Mixing** with alcohol, benzodiazepines, sleep drugs, xylazine or medetomidine.
- **Drug interactions with CYP3A4 inhibitors** (many HIV drugs, some antifungals and antibiotics, grapefruit). They can prolong and intensify fentanyl and raise buprenorphine levels. See “Genetics and tests” in the opioids chapter.
- **Combined withdrawal** from opioids with alcohol or benzodiazepines without medical care.
- **Heart and wound problems** from injecting (infection, heart-valve infection). Fever, a new heart murmur or unexplained fatigue need urgent care.

If you are not ready to stop. Harm reduction is a legitimate position, and the aim is to survive until you are ready. 1. Carry naloxone, and make sure someone nearby can respond. 2. Never use alone. 3. Use fentanyl test strips as one signal. They detect fentanyl but not every analog or nitazene, so a negative strip is not a guarantee. Follow the strip’s own instructions. 4. Take nothing that did not come from a licensed pharmacy with a prescription. If you use unverified supply, assume it may contain strong drugs. 5. After any break or supply change, assume tolerance is gone and the supply is stronger than you think. 6. Start medication even if you are not ready to stop. It is what keeps people alive. 7. Harm-reduction groups (NEXT Distro, local exchanges, syringe programs) provide naloxone and strips. SAMHSA (1-800-662-4357) can direct you.

3. Getting safe: the medical picture

Medication is the foundation (see the opioids chapter for the full table). Fentanyl-specific points for the prescriber to manage: - **Buprenorphine** can trigger sudden, severe withdrawal if started too soon after fentanyl, because fentanyl binds tightly and lingers. Prescribers use approaches such as low-dose induction. Do not time this yourself. Any DEA-registered prescriber can prescribe it, including primary care, emergency departments, telehealth and low-threshold clinics, many with same-day starts. Monthly (**Sublocade**) and weekly or monthly (**Brixadi**) injections exist. *A past Kernel reference to a six-month “Brixam” implant is wrong: the implant was discontinued.* - **Methadone** is often the most effective option for severe fentanyl

dependence, and may need higher doses than for heroin. It is given at licensed programs, with an ECG. - **Extended-release naltrexone** needs a full opioid-free period first, a risky stretch for fentanyl users. - Evidence supports extended, often indefinite, treatment. Stopping early sharply raises relapse and overdose-death risk. Medicaid covers MOUD in all states and Medicare Part D covers it; coverage denials can be appealed. - Withdrawal-comfort medicines and combined withdrawal rules are as in the opioids chapter. - If you also use xylazine or medetomidine, tell the clinic. Their withdrawal needs medical oversight.

Find help: findtreatment.gov or 1-800-662-4357.

4. The first weeks

The opioids chapter's timeline, craving interrupt, post-acute waves and rebuilding sections all apply. Specific notes for fentanyl:

- Fentanyl craving is not stronger than other opioid craving; it is more lethal, because following it after even a short break frequently kills.
- **Post-acute waves can feel exactly like early withdrawal.** The mind says "this is withdrawal; the answer is a dose." Name it instead: "This is a post-acute wave, not withdrawal. I have not used. Dosing after abstinence is what is lethal." Waves can last many months and may run longer after fentanyl.
- **First contact:** when a craving fires, contact your support person, prescriber or 988 *first*, before any other step.
- **Cues:** delete dealer numbers and apps, change routes and housing if needed. This is survival, not abandonment.
- **Pain, grief, loneliness and shame** are the main emotional triggers. Use the pain plan, not willpower, and use people.

5. Rebuilding

- Build the endorphin foundation as in the opioids chapter: exercise, connection, laughter, cold, music (including music that honours grief), service. Service to others with opioid use disorder, including carrying naloxone and peer support, is often called the most sustaining long-term source.
- **Grief is real.** The relationships, time and health lost deserve mourning.
- **Medical catch-up in week 1:** test for hepatitis C (curable in 8 to 12 weeks in most cases; do not wait), HIV (tell the HIV clinician everything you use, since many HIV drugs block CYP3A4), hepatitis B vaccination. Get wounds and heart symptoms checked.

- **Pain:** buprenorphine can treat pain and dependence together. Other options are in the opioids chapter.
- **Legal and practical:** drug court, MOUD in correctional settings, and reentry planning with medication continuation. See the incarceration chapter.
- **Supplements and peptides:** same rules and evidence labels as in the opioids chapter. All peptides are physician-only research compounds.

6. Genetics and tests

Same labels as in the opioids chapter. For fentanyl the useful test is **CYP3A4 and medication interactions** [Established for interactions]. Other findings (OPRM1, COMT, MTHFR, SLC6A4, GABRA2) are **[Kernel hypothesis]**. Never delay medication or safety steps for test results.

7. Milestones [Kernel projections]

Window	Focus
Day 0 to 7	Naloxone in hand, medication started with careful induction, no use alone.
First 2 weeks after any release, discharge or detox	Highest-risk window. Naloxone, medication bridge, written 72-hour plan before leaving.
0 to 3 months	Medical baseline (infections, pain plan, wounds). Foundation habits. Cues cut.
3 to 12 months	Post-acute waves named and logged. Endorphin architecture built. Identity and legal repair begin.
Year 1 to 2	Medication reviewed with the prescriber, not by calendar.
Years 3, 5, 10	Pain plan current. Peer work. Naloxone at home and a written lapse plan for life.

The Kernel's one 12-month projection for a fentanyl-like profile (a person who moved from prescription opioids to street supply) is 74% versus 40% retention in medication treatment and 82% versus 55% with no overdose. These are Kernel estimates, not trial results.

8. For clinicians

- Counsel on hotspots, analogs, xylazine, medetomidine and nitazenes. Test strips do not detect all of them. Naloxone does not reverse xylazine or medetomidine; nitazene overdoses may need repeated doses.
- Medetomidine withdrawal is a hospital-level syndrome and warrants admission-level monitoring.
- Plan buprenorphine initiation for fentanyl exposure (low-dose approaches). Methadone may need higher doses. Disclose and check CYP3A4 interactions.
- Make post-release and post-discharge continuity of medication a standing protocol, with take-home naloxone.
- Screen for infections and wounds. Treat hepatitis C promptly.

9. For families and supporters

- Naloxone at home. Know the signs, including rigid chest and “still sedated after naloxone.”
- Stay with a revived person for at least 90 minutes and call 911 anyway.
- Be present in the two weeks after any release or discharge.
- Do not assume the person’s old amount is safe. It is not.

KEY POINTS

- Fentanyl’s potency and uneven mixing mean there is no reliable dose.
- Naloxone saves lives but does not reverse xylazine or medetomidine, and nitazenes may need repeated doses. Call 911 anyway.
- Medication is the foundation. Do not stop it early.
- The two weeks after release, discharge or detox are the most dangerous.
- A break is not a reset. Never use alone. Nothing unverified is safe.
- Medetomidine withdrawal needs hospital care.

Kratom and 7-OH

> **In this chapter.** Kratom (*Mitragyna speciosa*) and the concentrated 7-hydroxymitragynine (7- OH) products made from it: what they are, why dependence develops, and how to get off safely. Kratom is two substances depending on amount and form. Dependence on higher amounts and on 7-OH products is opioid-type, so the opioid framework (medication, naloxone, lost tolerance, pain plans) applies. This chapter has a shared part and short **substance-specific notes** at the end. Content is US-centred.

EMERGENCY BOX: call 911 for: - severe sedation, difficulty waking, or slow or stopped breathing, especially with extracts or 7-OH. Give naloxone if you have it. It may only partly reverse kratom-family toxicity, so it supplements 911; it does not replace it. If the overdose looks worse than kratom alone would explain, assume possible fentanyl contamination. - yellow skin or eyes, dark urine, severe abdominal pain or extreme fatigue (possible liver injury): stop and get emergency evaluation - palpitations, racing heart, fainting or dizziness (possible heart-rhythm effect): get an ECG - chest pain, seizure, vomiting blood, or confusion - mixing with alcohol, benzodiazepines, sleep drugs, opioids or gabapentin

988 (call or text), Poison Control 1-800-222-1222, SAMHSA 1-800-662-4357, Never Use Alone 1-800-484-3731, Crisis Text Line: text HOME to 741741. **Tell every clinician the specific substance.** Kratom alkaloids are not reliably detected on standard opioid urine screens, so it may not appear in your record.

See “The 12 Safety Rules” in the Handbook for the shared rules.

1. What it does and why it hooks people

Two substances in one plant. Kratom contains many alkaloids. Mitragynine is the most abundant; 7-OH is present in small amounts but is far more potent at the opioid receptor **[Established]**. - **Lower amounts of leaf or powder:** more stimulant-like (energy, alertness, social ease). - **Higher amounts, extracts and isolates:** opioid-like (pain relief, sedation, warmth). - **7- OH products** (tablets, gummies, shots, concentrated extracts) sit at the far end: near the pure- opioid profile, with the highest dependence risk, the highest overdose risk and the most severe withdrawal.

Your body also converts some mitragynine to 7-OH, mainly through the liver enzyme **CYP3A4** **[Emerging]**. So medicines that slow CYP3A4 can raise the opioid-like effect, and medicines that speed it can trigger withdrawal.

The escalation pattern. A person starts for energy. The energy effect needs more. Then the opioid effect emerges at the higher amount, and the dependence is the same receptor- downregulation process as with prescription opioids.

Three reasons people come to it. Each changes the plan. 1. **Opioid replacement.** Getting off pills or heroin without a prescriber. Stabilise this dependence first, then deal with the underlying opioid history and original driver (pain, trauma). 2. **Chronic pain.** Stopping without a pain plan fails. 3. **Energy, focus and function.** Often an unrecognised ADHD or fatigue problem. The stimulant-recovery ideas apply alongside the opioid ones.

The preference was a signal. For many people it was resourceful harm reduction that developed its own problem. Compassion, not shame, is the Kernel's stance.

Why products are unpredictable. Content varies by batch, brand and storage. An FDA recall found 7-OH tablets with much more 7-OH than the label stated. Some multi-ingredient products add other compounds (for example kava, or a stimulant caffeine metabolite such as paraxanthine), which can add their own withdrawal, such as a stimulant crash on top of the opioid-type withdrawal. A "dose" found with one product cannot be carried to another. A fading effect is not a reliable sign to take more.

2. Danger points

- **Overdose** is most likely with extracts and 7-OH, and especially in combination with other sedatives.
- **Liver injury.** Documented with kratom, usually 1 to 8 weeks after starting or increasing, often cholestatic or mixed. Some cases resolve on stopping; severe ones need a liver specialist. Avoid alcohol while liver enzymes are raised.
- **Heart rhythm (QTc).** Mitragynine has documented QTc effects, raised by some antidepressants, antipsychotics, antibiotics and antifungals.
- **Contamination.** Salmonella outbreaks have been linked to kratom powder. Heavy metals (lead, nickel) have been found. Counterfeit pills sold as kratom or 7-OH have tested positive for fentanyl, which is rare but documented.
- **Interactions** (CYP3A4): grapefruit, fluconazole, clarithromycin, many HIV drugs and some antidepressants can dramatically raise the effect. Rifampin, St John's wort and carbamazepine can cause withdrawal.
- **A break is not a reset.** If you have been off for any stretch, tolerance is lower. This is the opioid rule, and the Kernel applies it here.
- **A moving supply.** Legal changes can cut off products with little warning. A sudden loss should not become unplanned cold turkey or a street opioid.
- **Mixing meth or other stimulant withdrawal with 7-OH withdrawal.** They feel nearly opposite. Do not treat one with the other's tools. For example, do not use pseudoephedrine during opioid-type

withdrawal, because added stimulation spikes cardiovascular stress. Handle with medical supervision if you are coming off both.

Legal status (dated: as of early September 2026, may have changed since)

Earlier Kernel text said kratom was federally legal because the DEA "backed off" in 2016. That is out of date. In July 2026 the DEA filed notices of intent to temporarily place concentrated 7-OH (above a set concentration) and three synthetic 7-OH derivatives in Schedule I. Secondary reports say the three derivatives were scheduled from 26 August 2026, and that the 7-OH threshold order had not been reported as published by early September. Federal health agencies said the action was not aimed at natural leaf kratom below the threshold. Some states go further: Alabama, Arkansas, Indiana, Rhode Island, Vermont and Wisconsin already ban kratom, and Florida moved on concentrated 7-OH in 2025. **Verify the current federal and state position before buying, carrying or relying on any product.** If your supply could be cut off, talk to a prescriber *now*, before you run out.

3. Getting safe: the medical picture

- **Start with an assessment.** Ask for liver tests, an ECG if you have palpitations or take other QT-prolonging drugs, and a review of every medicine for CYP3A4 interactions.
- **The opioid medication framework applies.** Buprenorphine has been used successfully for kratom-family withdrawal in multiple case reports and series, but not large trials [Emerging for kratom; Established for opioid use disorder]. Ask for it by name. Tell the prescriber: you are dependent on a kratom-family product that acts on the opioid receptor; you have opioid-type withdrawal; you are asking about buprenorphine- assisted management. Any DEA-registered prescriber can prescribe it. Because 7-OH binds tightly, buprenorphine started too early can trigger sudden withdrawal; the prescriber chooses the induction method. Extended treatment is associated with better outcomes than short courses.
- **Extended-release naltrexone** is an option only after full clearance (typically about a week or more opioid-free).
- **Clonidine, hydroxyzine and other comfort medicines** are prescriber decisions.
- **If you and your prescriber choose a taper,** small steps, held until stable, with the pace set by the prescriber. Products vary, so a taper by weight or count is imprecise. Do not switch vendors mid-taper. Extracts are harder to taper than powder. At very low amounts, stopping may be easier than further cutting. The Kernel's sources disagree on the exact pace; that is a prescriber's choice, not a number for this guide. No self- managed taper away from other opioids without medical guidance. **Do not use a different product as a "bridge" or a vendor-supplied precision-pill plan without a clinician.** The sources behind this chapter include vendor-linked material and peptide- heavy plans that are not standard care.

- **Heavy use cannot simply be stopped.** Going cold turkey after heavy 7-OH use can be dangerous (severe withdrawal; relapse at zero tolerance).
- **Supply control helps.** A trusted person holding the supply, and removing all product from home, car and workplace. Do not keep any "just in case."
- **Gabapentin** is sometimes prescribed for restless legs or nerve pain in withdrawal. It needs a prescriber and has its own dependence risk.
- **Medication for other conditions.** If you also use alcohol, benzodiazepines or sleep drugs, do not stop them suddenly.

4. The first weeks

Withdrawal timeline (opioid-type; 7-OH isolates sit at the severe end) | Window | What to expect | |—|—| | 12 to 24 hours after last use | Onset: restlessness, yawning, anxiety, aches. | | 24 to 72 hours | Peak: body aches (often low back), insomnia and restless legs, anxiety, nausea, diarrhoea, depression, intense craving. Generally less severe than heroin and more severe than typical prescription-opioid withdrawal; many people say 7-OH is worse than they expected. | | Days 3 to 7 | Physical symptoms ease. Depression is often prominent. | | Weeks 2 to 12 | Episodic post-acute waves: good days then bad days with no trigger. Characteristic, not relapse. |

What helps (non-drug). - Hydration with electrolytes and regular meals with protein, even when you are not hungry. Ginger and bland foods for nausea. - Movement: even 10 minutes of walking. Hot baths and heat for aches. Morning daylight. - **Sleep** is usually the worst part. Same bedtime, cool dark room, screens off, no alcohol, and CBT-I (cognitive behavioural therapy for insomnia) is the strongest non-drug treatment. Discuss any sleep medicine with a prescriber. Avoid daily antihistamine sleep aids. - **Cravings are waves.** They commonly last 15 to 30 minutes. Look at the clock, commit to waiting 20 minutes, move, change location, call someone, eat, cold water on the face. - **Cues:** remove all product and anything that brings it to mind. Map when you usually reach for it (morning, after work, stress, loneliness). - **Pain-driven craving:** the craving is accurate. Use the pain plan, not just willpower. - **Fatigue-driven craving:** brief vigorous movement; manage caffeine rather than replace one dependence with another. - **Tell someone.** Isolation is where relapse lives. NA accepts kratom and 7-OH. SMART Recovery and SAMHSA are open to everyone.

If you slip. A slip is information and a medical risk. Stop at that dose, tell someone, assume tolerance is lower, keep naloxone near, and re-engage your plan the same day. A slip is a puddle; going back to heavy daily use is the ocean. Your brain will tell you "just once is fine." For an opioid-type dependence, that is the loudest lie.

5. Rebuilding

Use the opioid rebuilding plan (exercise, connection, laughter, cold, music, service) plus: - **For the stimulant-like profile:** high-intensity exercise with a competitive element, mastery projects, and an **ADHD evaluation**. Treating ADHD removes the main driver. Avoid dopamine-raising supplements (for example tyrosine) if there are any psychotic symptoms; get psychiatric care first. - **For pain:** a real plan with a pain clinician and a physical therapist: exercise, physical therapy, mindfulness-based pain programs, TENS, heat and cold, acupuncture, sleep, and buprenorphine if pain and dependence coexist. Low-dose naltrexone is a prescriber decision, only in full opioid-free recovery. - **Treat depression, anxiety and trauma** as their own conditions, with trauma therapy after medical stability. - **Identity:** Full Inventory, Amends to Self, and *Manning* (serving others) follow once stable. See those chapters.

Supplements. "Dose with your clinician and pharmacist." Plausible but mostly **[Emerging]**: methylfolate (especially if you know you have MTHFR variants; avoid synthetic folic acid), B12, magnesium, omega-3, vitamin D with K2, NAC. Agmatine, black seed oil and large-dose vitamin C are community-reported, **[Emerging]** at best, and large vitamin C doses are not harmless for everyone; check with a clinician. Liver support such as milk thistle or alpha-lipoic acid is not a substitute for liver tests. **Peptides (BPC-157, Selank, Semax, DSIP, Epitalon, TB-500, Dihexa) are research compounds** that the FDA lists as having significant safety risks (immunogenicity, impurity, no established human dosing). They are not proven for this use. Physician only. You can recover without them. Source claims about peptides "reversing receptor damage" or being "safer than" opioid medication are not established.

6. Genetics and tests

Never delay getting care for test results. - **CYP3A4** [Established as an interaction issue; Emerging for kratom]: the most useful single item. Do a medication review, not just a gene test. - **OPRM1 A118G** **[Emerging]**: possibly relevant to naltrexone response. Mixed evidence. - **CYP2D6** [Established for codeine and tramadol]: a safety marker for prescription opioids. *Correction: earlier Kernel text said CYP2D6 is buprenorphine's main route; it is not. Buprenorphine is cleared mainly by CYP3A4. CYP2D6 plays a minor role in kratom alkaloid metabolism.* Carry your result. - **COMT, MTHFR, DRD2, BDNF** **[Kernel hypothesis]**: Val/Val ("Warrior") may be drawn to the stimulant-like effect; Met/Met ("Sage") to relief from a hot nervous system. These are hypotheses, not personality types.

7. Milestones [Kernel projections]

Window	Focus
0 to 3 months Window	Liver and heart checks. Medication or a prescriber-led taper. Product out. Pain or energy plan in place. Post-acute waves Focus logged.
3 to 12 months	Endorphin rebuild (exercise, connection). Sleep restored. Identity and inventory. Medication reviewed.
Year 1 to 2	Natural reward carries more of the load. The pain or energy plan holds with no kratom rescue.
Year 3	Review labs (including liver). Supplements step down to maintenance. Transplant energy into a practice.
Year 5	Triggers are pain flares, deadlines, legal or supply changes. Service and mentoring.
Year 10	Naloxone at home and a written relapse plan (the opioid rule). New pain from age or surgery: plan ahead.

The Kernel's 12-month projection for a kratom-and-chronic-pain profile (37-year-old with fibromyalgia) is: dose reduction of 50% or more in 65% with a pain plan versus 20% with standard care. This is a Kernel estimate, not trial data, and the measure is dose reduction, not necessarily abstinence. No 7-OH-specific projection exists; opioid use disorder cases are the nearest analogue.

8. Substance-specific notes

Kratom leaf, powder and capsules

- Lower amounts are stimulant-like and higher amounts opioid-like. Escalation across both is common.
- Test for liver injury if use was significant. Alcohol makes it worse.
- Powder has been linked to salmonella; fever, diarrhoea and vomiting can be infection and not withdrawal.
- Taper is possible but imprecise. See section 3.

Extracts and 7-OH products

- Treat as opioid use disorder. Naloxone at home. Never use alone.
- Potency is unstandardised and the label may be wrong.
- Multi-ingredient shots can add kava-type or stimulant withdrawals.

- Legal status is changing. Plan for supply disruption with a prescriber.
- Do not buy from unlicensed sources “to taper.” That is a chain-of-custody problem. See the opioids chapter.
- Do not use a “precision pill” from the same market as the problem, or a different product as a bridge, without a clinician’s agreement.

9. For clinicians

- Document the specific product. Kratom is not reliably detected on opioid screens, so the record may be silent.
- Offer opioid use disorder assessment. Buprenorphine has case-series support; avoid precipitated withdrawal with a careful induction approach. Naltrexone only after clearance.
- Order liver tests (AST, ALT, GGT, bilirubin) and an ECG if palpitations or QT-prolonging drugs are present. Review CYP3A4 inhibitors and inducers.
- Consider contamination (fentanyl, salmonella, heavy metals). Naloxone should be prescribed.
- Pain and ADHD evaluation are part of the plan. Taper pace is individualised. Where sources disagree, use clinical judgment.
- Heavy 7-OH withdrawal may require supervised care. Evidence for peptide stacks is limited to animal data and community reports.

10. For families and supporters

- Keep naloxone at home. Learn the signs: hard to wake, slow breathing.
- Product that looks like a “supplement” can be a strong opioid. Do not argue about the label; focus on safety.
- Help with a plan for what the product was doing: pain, energy, sleep, or opioid withdrawal.
- If the person is getting liver symptoms (yellow eyes, dark urine) or palpitations, get them seen the same day.
- Legal changes can cause sudden loss of supply. Encourage them to talk to a prescriber now.

KEY POINTS

- Kratom is stimulant-like at low amounts and opioid-like at high amounts; 7-OH products are the strongest and riskiest.
- Withdrawal is opioid-type. Ask for buprenorphine-assisted care by name.
- Check liver, heart and medication interactions (CYP3A4) first.

- Have a pain or energy plan before stopping. Stopping without one fails.
- Naloxone at home. A break is not a reset. Never use alone.
- Legal status is changing. Verify it, and plan for supply loss with a prescriber.

STIMULANTS

Cocaine

> **In this chapter.** Powder cocaine: what it does, why the binge pattern is so hard to stop, the heart and blood-count checks that belong in week one, and how to rebuild a life with real intensity in it. Crack is covered in its own chapter, which builds on this one. This chapter is US- centred.

Emergency box - **Call 911** for chest pain, pressure, jaw or left-arm pain, shortness of breath, or a sudden severe headache during or after use. Do not wait and do not assume it is anxiety. Cocaine causes heart attacks and strokes in people of any age. - **Call 911** for confusion, slurred speech, facial drooping, arm weakness, a seizure, a very hot body (above about 104°F / 40°C, or hot and no longer sweating), or extreme agitation, paranoia or hallucinations. Start cooling while you wait (ice packs at neck, armpits, groin). Use the recovery position for a seizure. - There is **no reversal drug** for cocaine overdose. Care is supportive. - **Never combine cocaine with alcohol.** Together they form cocaethylene, which lasts longer and is harder on the heart than either alone. - **Fever, mouth sores, a severe sore throat or unusual infections** in a cocaine user: same-day emergency care and a blood count (see levamisole below). - Suicidal thoughts: **988** (call or text). Crisis Text Line: text HOME to 741741. Poison Control: 1-800-222-1222. SAMHSA: 1-800-662-4357. Never Use Alone: 1-800-484- 3731. - Shared rules (naloxone, unknown supply, lapse = medical risk) are in the Handbook chapter “The 12 Safety Rules.”

What it does and why it hooks people

Cocaine blocks the re-uptake of three brain chemicals at once: dopamine (reward, drive), serotonin (warmth, social ease) and norepinephrine (energy, alertness). **[Established]** That “triple hit” explains the euphoria, the confidence and the racing heart.

The binge pattern is built into the molecule. Cocaine peaks within minutes and fades within an hour. As it fades, the brain dips below baseline, so the next dose is taken to avoid the crash, not to get high. A night ends when the supply runs out, not when the person decides. Redosing is the signal to watch for: each extra dose inside a session adds heart risk far faster than it adds any pleasure.

Cocaine as the “Warrior’s drug.” The Kernel suggests people whose brains clear dopamine fast (COMT Val/Val, the “Warrior”) and who run flat at baseline find cocaine’s surge especially compelling. **[Kernel hypothesis]** Whatever the genes, the practical point holds: the drug often fills a real need (aliveness, focus, social ease, performance), and recovery works when that need is met another way. Understanding this explains the pull. It does not make the drug safe. **Routes differ.** Snorting brings nasal damage and loss of

smell; injecting adds infection risk; smoking is covered in the Crack chapter. Chewing coca leaf is pharmacologically very different from concentrated cocaine.

Danger points

Danger	What to know
Heart attack and stroke [Established]	Cocaine can spasm the coronary arteries shut, surge norepinephrine and make blood clot more easily. Clean arteries are no protection. A healthy 25-year-old can have a heart attack. The risk does not fade with experience.
Overheating [Established]	Severe agitation with a very high temperature and collapse is a medical emergency. Cool and call 911.
Psychosis [Established]	Paranoia, hallucinations, “coke bugs.” Move the person to a calm, safe place; call 911 if there is violence risk or they cannot be kept safe.
Alcohol (cocaethylene) [Established]	A major share of cocaine deaths involve alcohol.
Levamisole [Established risk; prevalence is a Kernel estimate]	A veterinary deworming drug used as a cutting agent. It can destroy white blood cells (agranulocytosis). The Kernel estimates it is in roughly 70 to 80 percent of US supply. Symptoms (fever, mouth sores, severe sore throat, infections) usually appear 1 to 3 weeks after exposure and look like ordinary illness. It usually reverses within 2 to 3 weeks of stopping; severe cases need hospital care. Fentanyl test strips do not detect it.
Fentanyl and other adulterants	Fentanyl now contaminates cocaine and counterfeit pills. Newer contaminants include nitazenes (strips may miss them), xylazine and medetomidine (naloxone does not reverse these). Test strips are imperfect. A stimulant can mask opioid sedation. Keep naloxone at home even if you do not use opioids. It still helps with the opioid part of a mixed overdose; call 911 and give repeat doses as directed. Never use alone.
Tolerance after a break Danger	A break is not a reset. Tolerance falls, and a What to know familiar amount can overwhelm the heart.
Interactions	Some antifungals, some antibiotics and grapefruit can prolong cocaine’s effect. [Emerging] Tell any prescriber what you use.

Getting safe: the medical picture

Cocaine withdrawal has no seizure risk and is not medically dangerous. It is psychologically hard, in proportion to how much the drug was filling a need. What is medically important is the *damage from use*, so assessment belongs in the first week, not months in.

Ask a clinician for: - A heart check (ECG, blood pressure; an echocardiogram if you have symptoms or a heavy history). Cocaine cardiomyopathy is documented and the damage is progressive. - A complete blood count now, repeated at 1 and 3 months (levamisole). - An ENT check if you snorted (septum, palate, smell). - HIV, hepatitis B and C testing and an endocarditis check if you injected; STI testing if use happened in sexual settings. - An ADHD evaluation if it applies (see below).

Medication. No drug is FDA-approved for cocaine use disorder. That is a real gap. Options a prescriber may discuss:

Option	Evidence
Bupropion	Modest for craving; better for withdrawal depression; also treats ADHD. Slow CYP2B6 metabolizers accumulate it, so check first.
Modafinil / armodafinil	Early fatigue and thinking problems.
Naltrexone	Modest; may suit people who also have alcohol problems.
GLP-1 medicines	**[Emerging]** Early data only.
Disulfiram	Mixed; requires complete alcohol abstinence.
Non-stimulant ADHD medicines (atomoxetine, guanfacine, viloxazine, bupropion)	Strong rationale **if ADHD is confirmed**.

Doses, durations and combinations are an addiction-medicine prescriber's decision.

The ADHD question. Cocaine blocks the same transporter as methylphenidate. Some people used it to focus, and the ADHD was never diagnosed. If cocaine was your focus drug and you struggle with attention when sober, ask for an evaluation. Treating ADHD removes a real driver of use.

The first weeks

When	What happens	What helps
Hours 0 to 24: the crash	Heavy fatigue, sleep, low mood, big appetite, strong craving.	Sleep, eat, hydrate. Do not fight it.

When	What happens	What helps
Days 1 to 3: the honeymoon	A partial rebound that feels like recovery.	Not recovery. Use it to set up routine and support.
Days 3 to 28	Flat mood (anhedonia), cue-triggered craving, poor sleep, foggy thinking. The highest relapse risk.	Leave cue environments, keep supports close, exercise, medical follow-up.
Months 1 to 3	Pleasure returns in moments; Keep logging triggers. craving is episodic and cue-triggered.	

Cue-triggered craving. Cocaine craving is among the most cue-reactive in addiction medicine. A song, smell or place can fire the craving before you have had a thought. So the response is behavioral first. These episodes can return months into recovery. They are not relapse. Phantom smell is common and fades.

The five-minute craving interrupt: 1. If a cue is present, **leave immediately**. Do not negotiate or "just say goodbye." 2. Do something physically intense (sprint, jumping jacks, cold water on the face). A high-voltage craving needs a high-intensity counter-signal. 3. Slow breathing (4-7-8, about six rounds). 4. Contact one person. You do not need rescue, you need contact. 5. Do the most intense healthy thing available (training, a game, a project). 6. Write down trigger, intensity (0 to 10), action and result.

Sleep. Binge-crash cycles wreck the body clock for weeks. Keep a fixed wake time, dim light at night, and use slow, warm, quiet audio rather than stimulating music. A supplement stack for sleep is a pharmacist/clinician conversation.

Rebuilding

Replace the function. Make a list of what cocaine did for you (confidence, energy, focus, social ease, performance, escape). Each is a need that stays. Match each to a real source.

For intensity seekers, a calm-only plan tends to fail. Sources the Kernel ranks highly: - Hard, short, high-intensity exercise (intensity matters more than duration). - Direct competition (sport, martial arts, chess, sales contests). - High-stakes work built on real preparation. - Creative mastery with an audience. - Cold exposure combined with exercise (alertness without cardiac toxicity). Check with a clinician if you have any heart problem. - A few deep relationships. - **Service**, such as peer support, which the Kernel calls the most reliable long-term source of reward for this profile. Keep several outlets. A single source of reward is fragile.

Rebuild social confidence on purpose. Cocaine's social ease was partly chemistry and partly practiced performance. The chemistry returns with abstinence. The skill needs practice: start with small, low-stakes settings, prepare, and use a recovery community as a training ground.

Replace the scene, don't just reduce it. Cocaine was the social drug. For high-risk events, arrive late, leave early, bring a sober companion and have an exit ready.

Identity and work. "I can't do my job without it" is a real fear. The work is to find what competence looks like when it rests on your real capacity. Money, work and family repair follow (see the Handbook chapters on those topics).

Supplements. The Kernel layers methylation support, amino-acid precursors, a membrane- building stack, NAC (N-acetylcysteine), omega-3 and sleep aids. Evidence is thin to mixed: NAC has the best case for craving but trial results are mixed **[Emerging]**; most of the rest is [Kernel hypothesis]. Peptides (for example BPC-157, Semax, Selank, Dihexa) are research compounds with limited human data: **physician only, never self-started.** - Dose with your clinician or pharmacist, and run every addition through an interaction checker. - **Do not take dopamine- raising supplements (tyrosine, L-DOPA sources such as mucuna, DLPA, rhodiola, receptor- building stacks) while psychotic symptoms are active. Wait for psychiatric clearance.** Mucuna and DLPA also interact with MAOI antidepressants. - **5-HTP** only on a physician's advice, never with an SSRI or any serotonergic drug (serotonin syndrome risk). - Avoid synthetic folic acid if you have an MTHFR variant; ask about methylfolate. **[Kernel hypothesis]**

Genetics and tests

Do not wait for results to start. The Kernel's priority genes for cocaine are:

Gene	Kernel hypothesis
COMT Val/Val	Fast dopamine clearance, flat baseline; recovery needs real intensity.
DAT1 10-repeat / DRD4 7-repeat	Faster clearance and novelty seeking; overlap with ADHD.
DRD2 A1	Fewer D2 receptors; build several reward sources, not one.
SLC6A4	May set how strong cocaine's social warmth felt.
MTHFR	Methylation support may matter.
BDNF Met	Exercise becomes non-optional.
CYP2B6 / CYP3A4	Bupropion handling; drug interactions.

[Kernel hypothesis] These associations are not proven predictors of personality or addiction type. Until results arrive, ask: Did cocaine make me feel like my full self? Was the first line never enough? Is my sober baseline flat? Do I suspect ADHD? One caution on ordering: whole- genome sequencing returning a standard variant file (VCF) is what you want; methylation (bisulfite) sequencing is a different test.

Milestones (Kernel projections, not trial results)

When	Focus	Expected
0 to 3 months	Heart, blood count, crash, cue exits, exercise, ADHD question	Crash passes; D2 receptors begin recovering; episodic cravings.
3 to 12 months	Social confidence, intensity architecture, identity, medication review	Near-normal ability to enjoy things; cravings mostly contextual.
Years 1 to 2	Competition and craft carry the load; sober community	Performing "from a rebuilt platform, not a borrowed one."
Year 3	Cardiac follow-up, medication review, supplements step down to upkeep (not to zero)	Repair tracks at maintenance.
Year 5	Triggers are work and parties more than cues; service	Mentoring others.
Year 10	Stewardship	**The heart risk does not reset the way craving does.**

The Kernel's detailed cocaine timeline stops at about 12 months. Years 3 to 10 are extrapolation. Deep-root repair may take 2 to 5 or more years after heavy long-term use, and some changes may be partial.

Kernel projection for one profile. The Kernel's illustrative case (a 34-year-old with a Warrior profile and daily use, using bupropion with a prescriber) projects 65 percent sustained abstinence at 12 months for an adherent protocol versus 20 percent for standard treatment. These are archetype estimates, not a trial of the Kernel. They are best read as "a good plan helps," not as odds.

FOR CLINICIANS

- Cardiac assessment, CBC (baseline, 1 and 3 months) and ENT/infectious screening early; cardiomyopathy and progressive injury are documented.
- Levamisole: consider in any neutropenia or vasculitic picture in a cocaine user.
- Cocaethylene: ask about alcohol. Cooling and supportive care for hyperthermia.
- No approved pharmacotherapy; bupropion, modafinil, naltrexone, GLP-1 agents and disulfiram have limited or mixed evidence. Screen and treat ADHD; non-stimulant options first.
- Screen for fentanyl and nitazene exposure; naloxone co-prescription.
- Supplements and peptides: weak evidence; check interactions; avoid dopamine-raising agents with active psychosis.

For families and supporters

- Learn the emergency signs and call 911 first. Do not drive someone with chest pain.
- Keep naloxone at home; it will not harm someone who has not taken opioids.
- Do not argue during a crash or craving. Help them sleep, eat and move.
- Offer to attend a medical appointment. Help plan events: a ride, an exit, no alcohol.
- A lapse is information and a medical risk. Call for help rather than shaming.
- Look after yourself too: SAMHSA 1-800-662-4357, family support groups.

KEY POINTS

- Chest pain, stroke signs, high temperature, seizures or psychosis: call 911.
- Never mix with alcohol; keep naloxone in the house; never use alone.
- Get a heart check and blood count in the first week.
- Honeymoon days 1 to 3 are not recovery. Days 3 to 28 are the riskiest.
- Rebuild with real intensity, real connection and treated ADHD, not rest alone.
- A break is not a reset: tolerance falls but the heart risk stays.

Crack Cocaine

> **In this chapter.** Crack is the same molecule as powder cocaine, delivered by smoking. Everything in the Cocaine chapter applies: the heart, alcohol, levamisole, craving interrupts and rebuilding with intensity. This chapter adds what smoking changes (lungs, speed, the "rush memory," cues like the pipe and cash) and the legal and money aftermath many people carry. US-centred.

Emergency box - **Call 911** for chest pressure or pain; jaw, left-arm or back pain; a sudden pounding heartbeat with dizziness or near-fainting; a sudden severe headache; coughing up blood or dark-brown sputum; severe shortness of breath at rest; bluish lips or nails; sudden sharp one-sided chest pain; a very hot, flushed body that has stopped sweating; a seizure; or severe paranoia and agitation. Do not wait to see if it passes. - No reversal agent exists for cocaine emergencies. Care is supportive. - Never combine with alcohol (cocaethylene). A stimulant can mask opioid or benzodiazepine sedation, and fentanyl has been found in the crack supply. Keep naloxone. Naloxone does not reverse xylazine or medetomidine, and some contaminants such as nitazenes may need repeat doses; call 911. - 988 (call or text), Crisis Text Line (HOME to 741741), Poison Control 1-800-222-1222, SAMHSA 1-800- 662-4357, Never Use Alone 1-800-484-3731. - See "The 12 Safety Rules" for the shared rules.

What it does and why it hooks people

Same triple re-uptake block as powder cocaine (see the Cocaine chapter). The route changes everything: smoked crack reaches the brain in seconds, peaks in a 10 to 20 second rush and fades in 10 to 15 minutes. **[Established]** The faster and bigger the peak, the harder the crash and the more compulsive the redosing.

The rush memory. The brain stores the rush with unusual vividness. So craving is less a vague urge than a *prediction* of that specific event, firing in milliseconds, sometimes with chest tightness, a wave of heat or an almost-taste. [Kernel hypothesis, consistent with cue- conditioning research] Because of this, the interrupt is behavioral first, thinking second.

Binges run on a 10 to 15 minute clock. That means more doses, more cardiac events, more lung exposure, deeper depletion and far more money per session. Scraping and re-burning pipe residue is common at the end of a binge and adds lung harm.

Danger points

Everything in the Cocaine chapter's danger table applies (heart attack, stroke, overheating, psychosis, alcohol, levamisole, adulterants, tolerance after a break). Crack adds:

Danger	What it looks like	Response
Crack lung (diffuse alveolar hemorrhage)	Sudden shortness of breath, coughing blood or dark sputum, fever, chest pain	**911.** Life-threatening.
Bronchospasm	Sudden wheeze, tight chest, cannot finish a breath	Fresh air, use an inhaler if you have one; 911 if severe or not settling in minutes.
Collapsed lung (pneumothorax)	Sharp sudden one-sided chest pain, breathlessness	**911.** Needs hospital care.
Chronic lung damage	Cough, dark sputum, less stamina	Pulmonology evaluation; baseline lung testing.
Burns, lip cuts, dental damage, weight loss, skin picking	Pipe burns and cracked lips; "coke bugs" sensations	Clinical care; they are also cues in recovery.

Pregnancy: crack in pregnancy is linked to poor outcomes. If pregnancy is possible, arrange prenatal care early.

If you are not ready to stop. Help is still on offer. Harm-reduction points the Kernel lists: do not share pipes (lip cuts carry bloodborne infection risk like shared needles); use a proper mouthpiece; care for cracked lips; test supply for fentanyl (strips are imperfect); never use alone; carry naloxone. Local harm-reduction programs in most cities give free kits, naloxone and STI testing without judgment.

Getting safe: the medical picture

The crash is not usually medically dangerous, but the bingeing may have been. If there is chest pain or breathing trouble in the crash, **call 911 first.**

Week one: lung function testing (spirometry; repeat at about 3 and 6 months) and a chest X-ray or CT if you have symptoms; ECG and blood pressure (echocardiogram if you had cardiac symptoms); a blood count for levamisole now and at 1 and 3 months (crack is made from the same powder supply); a dental check (community health centres and dental schools are cheaper); nutrition; and prenatal care if relevant. Cough, breathlessness or coughing blood means pulmonology is urgent. Some lung damage reverses with stopping and some does not; the baseline tells you which.

Medication. Same as cocaine: nothing approved; bupropion, modafinil/armodafinil, naltrexone, emerging GLP-1 agents, and non-stimulant ADHD treatment if ADHD is confirmed. Prescriber's decision. Ask about naloxone for you and everyone at home.

Lungs. NAC thins mucus and is also studied for craving **[Emerging]**; antioxidant vitamins for the lungs are **[Kernel hypothesis]**. Pulmonary rehabilitation (supervised breathing and conditioning) helps if testing shows impairment. Dose supplements with your clinician or pharmacist.

The first weeks

When	What happens	What helps
Hours 0 to 4	Extreme fatigue, deep depression, overwhelming craving, shaking, possible paranoia	Lie down, water, food if you can. Do not use. Not alone if possible.
Hours 4 to 24	Heavy sleep	Sleep is repair, not failure.
Days 2 to 7: the vulnerable window	Gray, flat world; every cue from the crack context fires at full strength	Cue redesign is the main intervention; start movement.
Weeks 1 to 4	Fast, intense cue-triggered craving	Use the interrupt every time; log each one.
Months 1 to 12	Episodic, mostly cue-triggered craving; pleasure returns	Intensity architecture, service, legal and money work.

Crack timelines may run longer than for powder cocaine. The bottom of the crash is the highest- risk craving state. Have a person with you if you can, and use 988 if it becomes a crisis.

Cues unique to crack. The Kernel maps six: - **The pipe** (or any similar object): remove completely; look away and leave before thinking. - **The lighter's sound:** unavoidable, so name it ("that sound fired a craving"), breathe and move away. It fires fast and fades fast. - **Smoke smell** (also phantom smell): move away, name it, breathe, contact someone. - **Places** (the corner, the building): geography is one of the strongest and least avoidable cues. Relocate if you can; otherwise plan routes and schedules. - **Money in hand:** use automatic bill pay and direct deposit; put cash away when craving fires; stay away from supply with cash. - **The bottom of the crash:** support person, medical contact if severe.

Then the same seven-step interrupt as in the Cocaine chapter, with one addition: name it. ("My dopamine anticipation circuit fired because of this cue. This is a conditioned signal, not a command.") Strong beat drops and tempo changes in music can re-arm arousal circuits crack primed; use slow, warm audio for sleep.

Rebuilding

Start intensity early. Begin movement in week 2, even brief. By month 3, natural reward needs to give a real signal or the pull back stays strong. Sources: sprints, boxing, wrestling and martial arts (if cleared by your doctor, given lungs and heart); competition with real stakes; mastery at the edge of your skill; **service to others in crack recovery** (lived knowledge of the pipe, the crash, the neighborhood and the legal system is something no textbook has); and **financial recovery** as part of the plan. Every dollar saved is a real reward.

The legal and economic aftermath is recovery work. The Kernel's position, offered as its framing: crack dependence was biology, and the severe response many people received (the 100:1 crack-to-powder sentencing disparity; the Fair Sentencing Act of 2010 cut it to 18:1; the First Step Act of 2018 made that reduction retroactive for some federal cases) was a policy choice. Practical steps (general information, not legal advice; laws vary by state and change): - **Drug court** is both a legal requirement and a recovery structure; the accountability can help. - Tell your **probation or parole officer** about treatment, medical visits and meetings; this is usually viewed favorably. - Ask **legal aid or a public defender** whether convictions are eligible for sentence reduction, expungement or sealing. - **Housing:** some cities have Fair Chance rules; public housing and voucher rules have their own limits; recovery residences usually accept people with records. - **Work:** many states have Ban-the-Box laws; second-chance employment programs and workforce centres exist. - Peer support: Cocaine Anonymous (ca.org), SMART Recovery, local harm-reduction programs, reentry programs. Verify locally.

Supplements. Same rules as the Cocaine chapter: dose with a clinician, no dopamine-raising supplements while psychotic symptoms are active, 5-HTP only on physician advice and never with serotonergic drugs, peptides physician only.

Genetics and tests

Same panel as cocaine. **[Kernel hypothesis]** Crack-specific points: the Kernel suggests smoked delivery suppresses the repair factor BDNF more than snorting at equal doses, so exercise matters; and because smoking bypasses first-pass liver metabolism, interacting drugs (certain antifungals, some antibiotics, grapefruit) alter how long the effect lasts more than how hard the initial rush hits. **[Emerging]** Do not delay starting for results.

Milestones (Kernel projections, not trial results)

The Kernel has no crack-specific case or percentages. The nearest are the powder-cocaine figures in the previous chapter; treat them only as analogs.

When	Focus	Expected
0 to 3 months	Heart, lungs, blood count, teeth; cues, cash and geography; start intensity by week 2	Crash resolves; cravings fast and cue-driven; start legal and money map.
3 to 12 months	Intensity architecture, service, legal rebuilding	Significant D2 recovery; pleasure and motivation return; identity work.
Years 1 to 2	Records addressed where eligible; debt down; stable housing and work	Cravings mostly stress and old ground.
Year 3	Lung tests and medication review; supplements step down, not to zero	Maintenance.
Year 5	Stress and old ground are the triggers; peer recovery guide	Manning.
Year 10	**Heart and lung risk do not reset;** annual checks	Stewardship.

The detailed crack timeline stops at about 12 months; later years are extrapolation.

FOR CLINICIANS

- Baseline and repeat spirometry; CXR/CT if symptomatic; screen for pneumothorax and diffuse alveolar hemorrhage in acute presentations.
- Same cardiac, levamisole, dental and nutritional follow-up as cocaine (ENT only if also snorted); HIV/HCV testing and pipe-sharing counselling.
- Fentanyl co-exposure: naloxone; do not assume stimulant-only toxicity.
- Pharmacotherapy as for cocaine; no approved agent.
- Social determinants (legal, housing, income) are part of the treatment plan; consider peer recovery supports.

For families and supporters

- The emergency list is long; learn the breathing signs as well as heart signs.
- Keep naloxone and know where it is.
- Do not leave someone alone at the bottom of the crash if you can help it.
- Help with practical tasks: legal aid appointments, cash handling, a different route home.

- Keep blame out of it. The crash and craving are biology, and the legal aftermath is a barrier to recovery, not proof of weakness.

KEY POINTS

- Crack's heart risk is the same as powder, but faster, and the lungs add emergencies of their own.
- Chest pain, breathing trouble, coughing blood: 911.
- The pipe, lighter, smoke, corner and cash are cues: redesign geography and cash, not just intentions.
- Get lungs, heart and blood count checked in week one.
- Start intense exercise and service early; work the legal and money aftermath alongside.
- The heart and lung risk do not reset with time.

Methamphetamine and Amphetamines

> **In this chapter.** Methamphetamine and the amphetamine family, including prescription stimulants (Adderall, Vyvanse, Ritalin) and the "same biology" substances such as MDMA. Withdrawal will not cause seizures, but the crash carries a real suicide-risk window, and the heart, stroke and psychosis risks are serious. This chapter covers the crash, the long recovery curve, why a break is not a reset, and rebuilding. US-centred.

Emergency box - **Call 911** for chest pain, an irregular heartbeat, shortness of breath, a sudden severe headache, facial drooping or arm weakness, a seizure, a body temperature above about 104°F (40°C), or hallucinations and paranoid beliefs you cannot reason your way out of. Heart attack and stroke are real risks after heavy stimulant use. Overheating (severe agitation with a very high temperature and risk of collapse) is an emergency: cool and call. - **Psychosis** can persist for days to weeks after last use and needs medical evaluation. - **Suicidal thoughts or "more than I can get through":** call or text **988**, or text HOME to 741741 (24/7). Days 1 to 5 are the highest-risk window. - **Counterfeit pills:** pills sold as Adderall, Xanax, oxycodone or "Molly" may contain methamphetamine, fentanyl, nitazenes or other drugs. Fentanyl test strips miss some of these. Nothing unverified is safe. Keep naloxone; it does not reverse xylazine or medetomidine. - Poison Control 1-800-222-1222. SAMHSA 1-800- 662-4357. - See "The 12 Safety Rules."

What it does and why it hooks people

Methamphetamine forces dopamine-making neurons to dump their stores while blocking re- uptake. The flood is far beyond anything natural. **[Established]** The brain protects itself in three ways, which together form the trap:

What the brain does	What you feel
Removes D2 dopamine receptors	Life goes gray; nothing is enough; anhedonia is the baseline.
Makes less dopamine	A biological deficit, not a motivation problem.
Dopamine nerve endings are damaged at high doses (neurotoxic)	Slowed thinking, blunted emotion, low drive that may take a long time to repair.

The family. Prescription stimulants (Adderall, Vyvanse, Ritalin) and MDMA work through related mechanisms. Meth sits at the extreme (strongest flood, most neurotoxic, slowest recovery, highest psychosis risk); cocaine is vascular and short-acting (see its chapter); MDMA hits serotonin as well; prescription use at therapeutic doses carries less risk, but misuse still downregulates receptors. “It was just my medication” is a common denial; the dopamine disruption is real regardless of who wrote the prescription. **Never change or stop a prescription stimulant without your prescriber.**

What was it solving? The Kernel suggests stimulants often solve a real problem: undiagnosed ADHD, flatness, depression, trauma-driven hypervigilance, or an unsustainable workload (long shifts, several jobs, caregiving on top of a full day). The drug solved the problem while destroying the rest. Recovery means solving it another way.

Danger points

Danger	What to know
Heart and stroke [Established]	Heavy use raises the risk of heart attack, arrhythmia and stroke.
Overheating [Established]	Severe agitation with high body temperature and risk of collapse. Cool, 911.
Psychosis [Established]	Paranoid delusions or hallucinations; usually resolve in days to weeks, but can persist. A personal or family history of psychosis, schizophrenia or bipolar disorder makes further use a genuine contraindication; see a psychiatrist before any further use. The Kernel links this to the slow-COMT (Met/Met) profile [Emerging, evidence mixed]; **clinical history is the better guide than genes.**
Crash and suicide risk [Established]	The depression after heavy or prolonged use. Do not go through days 1 to 5 alone if you can avoid it.
Severe sleep loss Danger	Can cause brief dreamlike intrusions in waking (not psychosis by itself). Paranoid delusions or loss of reality testing are an emergency. What to know
Counterfeit and mixed supply	Pressed pills and powders may contain fentanyl, nitazenes or other drugs; unknown strength.
Alcohol or other sedatives to “come down”	Alcohol suppresses REM sleep and risks a second dependence.
Tolerance after a break	A break is not a reset (see “A break is not a reset” below).

Danger	What to know
Interactions	Amphetamines and MDMA with SSRIs, MAOIs and other serotonergic or sympathomimetic drugs risk serotonin syndrome and blood-pressure crises. Tell any prescriber what you use.

Use level shapes the plan. *Low* (occasional, a few weeks): can usually stop with a support contact. *Medium* (regular, no extended binges): support and structure from day one. *High* (multi-day binge-crash cycles for months): medical support during the crash is strongly advised. *Chronic, especially smoked or injected:* full medical and psychiatric support and formal treatment, not a purely self-directed plan.

Getting safe: the medical picture

Withdrawal is rarely medically dangerous the way alcohol or benzodiazepine withdrawal can be. There is **no antidote and no substitute-and-taper strategy**. What is needed is monitoring and support:

- A psychiatric evaluation during the crash if depression is severe.
- Heart assessment if you have symptoms or a heavy history.
- Psychosis screen (history questions above).
- ADHD evaluation, if the fog could be ADHD or ADHD may have been driving use.

Medication. No drug is FDA-approved for methamphetamine use disorder. A prescriber may discuss:

Option	Evidence / caution
Bupropion	Modest craving evidence; check CYP2B6 status first.
Naltrexone	May blunt stimulant euphoria.
Modafinil / armodafinil	Fatigue and thinking in early recovery.
Mirtazapine	**[Emerging]** Several trials; helps if meth was managing depression.
Topiramate	Craving reduction, but can slow thinking in a brain already recovering.

"Ghost scaffolding." Some specialist programs use a time-limited, tightly supervised long-acting stimulant to bridge executive-function problems. [Emerging, debated] This is a **specialist decision**, not a strategy to pursue informally, and not a licence to self-medicate with any stimulant.

Ketamine is of research interest for stimulant use disorder **[Emerging]**; if ever considered it is specialist-supervised only, because a second dissociative can become compelling.

Stigma. People with meth use disorder report, and provider-bias research confirms, worse and more dismissive care. That does not mean hiding history that keeps you safe. Addiction- medicine specialists and harm-reduction clinics usually carry less bias. You may ask for a different provider.

The first weeks

Knowing the timeline changes what the misery means.

When	What happens	What helps
Hours 0 to 24: the crash	Extreme exhaustion, long sleep, hunger, depression	Sleep, eat, hydrate. Do not fight it.
Days 1 to 5: the Pit	Dopamine at the floor; severe depression and anhedonia; strong craving. **Highest relapse and suicide- risk window.**	Not alone if possible; walk outside daily; 988 if it becomes a crisis.
Days 5 to 14: the Gray	Flatness, fog, low motivation, insomnia; cravings triggered by people and places	Start light exercise (the repair signal); begin avoiding triggers.
Weeks 2 to 4: the Slow Return	Craving becomes episodic; sleep stabilizes	Daily structure; first realistic goals.
Days 31 to 90	New patterns consolidate; with exercise and sleep, receptors and gray matter improve measurably for most [Emerging: imaging studies, small]	Keep exercise, sleep and novel challenge going.
Months 1 to 18: PAWS	Episodes of sudden depression, craving and fog, lasting hours to days, triggered by stress, poor sleep, illness or cues	Not relapse. Return to basics, contact support.

Anhedonia feels like watching your life through glass: food, music and people stop registering. It has a name and a timeline and it is not you. A flat month 4 is expected: substantial D2 recovery appears to take about 12 to 17 months. **[Emerging]**

What makes it harder, and is avoidable: high-sugar food, caffeine and alcohol, nicotine and other stimulants, late screens and irregular bedtimes, dehydration and skipped meals, and isolation. **Exercise is the exception: more, as capacity allows.**

Sleep is the recovery, not a side benefit. Meth suppresses melatonin, destroys REM and disrupts the body clock for months. Fixed wake time, morning light, a real wind-down. Sleep supplements are a pharmacist

conversation. Vivid, intense dreams are common as REM rebounds and are not a sign you are losing your grip.

Craving interrupt. A craving is a neurological event, not a moral failure. It peaks at 15 to 20 minutes and passes. Locate it in your body; four rounds of 4-7-8 breathing; change your physical environment; contact one person; do your most intense healthy micro-reward; write down trigger, intensity, action and result.

Rebuilding

"The Recast": same engine, different address. You cannot remove the drive. The capacity for obsessive focus and sacrifice is also your strongest asset. Three exercises: 1. **Function audit.** What did meth actually do for you (energy, focus, confidence, social ease, sexual performance, escape, sixteen-hour days)? Each is a need that did not vanish. 2. **Replacement map.** Match each function to a real source, ruthlessly. "A gentle walk" does not replace "feeling powerful."

3. **Architecture.** Design a week with a daily high-intensity physical challenge, an activity with a mastery curve, a socially staked connection, a creative or building project with a visible outcome, and an act of service bigger than yourself.

If use was work-driven: the recovery task includes resolving the overwork. Rebuilding a dopamine system while returning to the same unsustainable schedule is rebuilding into the conditions that broke it.

Watch for addiction transfer. Gambling, sexual compulsion and risk-taking are the common targets. Name them now. Caffeine and alcohol are common substitutes in early recovery and are not neutral bridges (see the Caffeine chapter).

Identity and relationships. The stimulant identity is built on speed and capability. The question is who you are without the performance boost. Isolation is where relapse incubates. Trauma work belongs after biological stability. If meth was part of chemsex, see the Chemsex chapter.

Supplements. The Kernel's layers (methylation support, amino-acid precursors, a membrane- building stack, NAC, lion's mane, rhodiola, sleep aids) are mostly **[Kernel hypothesis]**; NAC and exercise have the best support **[Emerging]**. Rules: - Dose with your clinician or pharmacist; run an interaction checker. - **Do not start precursor supplements (tyrosine, L-DOPA sources, DLPA, rhodiola) too early.** Wait until you are eating regularly and acute withdrawal is stabilizing; on an unstable system they can worsen anxiety. The Kernel's sources disagree on timing (roughly day 3 to 7); a clinician decides. - **No dopamine-raising supplements while psychotic symptoms are active. Wait for psychiatric clearance.** - **5-HTP** only on physician advice and never with serotonergic drugs. Mucuna and DLPA interact with MAOIs. - Peptides (BPC-157, Semax, Selank, Epitalon, Dihexa) are research compounds with limited human data: physician only. - Advanced add-ons the Kernel mentions (NAD+ infusions, liver-support supplements) are optional extras on top of sleep, exercise and food, not substitutes. **[Kernel hypothesis]**

A break is not a reset

"A year off, then I'll know how to use safely" is only partly right. Receptors recover, but tolerance is genuinely lost. A familiar amount is then a dose for a body whose capacity has changed, which is where cardiac and overdose risk in relapse after a break concentrates. The old pathways are quieter, not deleted, and relapse after a break can escalate faster than the original use. The task is not erasure. It is building competing pathways strong enough to win. Neurons are not "fully replaced every seven years."

Genetics and tests

[Kernel hypothesis unless stated] Not a predictor of fate, and never a reason to delay starting.

Finding	Suggested meaning
COMT Val/Val ("Warrior")	Crash is flatness and boredom; needs real intensity.
COMT Met/Met ("Sage")	Crash carries more anxiety, rumination and sleep loss.
Met/Met plus psychosis history	Treat as a contraindication: psychiatric evaluation before any further use. [Emerging, mixed; **history matters more than genotype**]
DRD2 A1	Fewer D2 receptors; build several reward sources.
DRD4 7-repeat / DAT1 10-repeat	Novelty seeking, ADHD overlap; ask about evaluation.
MTHFR variants	Methylfolate may matter; avoid synthetic folic acid.
MAOA / BDNF Met	Impulsivity link; exercise intensity matters.
GABRA2	Thinner "brakes" between craving and action. A hardware, not character, difference.
CYP2D6 / CYP2B6	Bupropion and other medication handling.

Meth may shift how genes are switched on, and recovery works through the same channel in reverse (exercise, sleep, learning). Whether any such changes pass to children is an open question, not a fact. **[Emerging]**

Milestones (Kernel projections, not trial results)

When	Focus	Expected
0 to 3 months	Crash, Pit and Gray with support; psychosis and heart screen; sleep; exercise; cue redesign	Acute crisis resolves in weeks; cravings episodic by weeks 2 to 4; by day 90 receptors and gray matter improve for most.
3 to 12 months	Recast architecture; identity; workload; medication review	Mood near baseline for most; cravings mostly contextual; thinking largely restored.
Years 1 to 2	Substantial D2 recovery (12 to 17 months); relationships and work at a sustainable load	Meth feels "like a chapter in your history." Some damage may not fully return; aim for an optimized post-recovery baseline, not the past.
Year 3	Off-label medications reviewed; supplements step down (not to zero); mastery carries the load	Maintenance.
Year 5	Triggers are stress, poor sleep, illness and old work pressures; Manning	Guiding others.
Year 10	Stewardship: cardiac and mood checks	**No known "safe amount"; heart risk stays.**

The Kernel's detailed meth timeline stops at about 12 to 18 months; later years are extrapolation. Deep-root reversal may take 2 to 5 or more years.

Kernel projection for one profile. The Kernel's illustrative case (a 26-year-old with untreated ADHD, four years of use, adherent protocol including ADHD treatment and a bupropion bridge with a prescriber) projects 62 percent 12-month abstinence versus 15 percent for standard treatment, and 73 percent functional improvement at month 6. These are archetype estimates, not trial results.

FOR CLINICIANS

- Crash: screen for suicidality, psychosis, cardiac and cerebrovascular events, hyperthermia. Use-pattern classification guides intensity of support.
- Psychosis risk: personal/family psychosis or bipolar history is the key screen; genotype evidence is mixed.

- No approved pharmacotherapy; bupropion, naltrexone, mirtazapine, modafinil, topiramate have limited evidence; weigh CYP2B6 and cognitive effects. Specialist- supervised stimulant stabilization is debated.
- Assess ADHD once stable. Avoid layering stimulants. Document interactions with serotonergic drugs.
- Be aware of stigma and bias; counterfeit and adulterated supply (fentanyl, nitazenes) should be assumed.
- Counsel on lost tolerance after abstinence.

For families and supporters

- Days 1 to 5 are the riskiest. Stay with them or stay in touch. Know 988 and 911.
- Call 911 for chest pain, stroke signs, very high temperature, seizure or paranoid psychosis.
- Do not argue with delusions; keep the space calm and safe.
- Expect flat, irritable weeks. Encourage sleep, food, walking.
- Do not treat a lapse as failure. It is information and a medical risk.
- If a prescribed stimulant is involved, encourage a prescriber conversation rather than stopping suddenly.

KEY POINTS

- Withdrawal will not cause seizures, but the crash is a suicide-risk window; do not do days 1 to 5 alone.
- Heart attack, stroke, overheating and psychosis are emergencies; counterfeit pills are a hidden danger.
- No dopamine-raising supplements while psychotic symptoms are active; any supplement is a clinician conversation.
- Recovery is long: expect about 12 to 17 months for deep receptor repair, and flat days along the way.
- Rebuild with exercise, sleep, real intensity and a sustainable workload.
- A break is not a reset: tolerance falls and the heart risk remains.

Caffeine

In this chapter. Caffeine is the mildest drug in this series and still a drug. This chapter is for people whose use is costing more than it gives (anxiety, poor sleep, racing heart, crash-and- redose cycles). **Note on sources:** the Kernel has no dedicated caffeine chapter. This is assembled from scattered passages, and it has no caffeine withdrawal timeline, product table or case study from the Kernel. Material marked *general medical information* is added here and is not from the Kernel. US-centred.

Emergency box - **Call 911 or Poison Control (1-800-222-1222)** for chest pain, a pounding or irregular heartbeat that will not settle, fainting, seizure, confusion or repeated vomiting after a large amount of caffeine. - **Caffeine powder and concentrated pills are the most dangerous forms:** a small measuring error can be a large overdose. Avoid them. - If you have a heart condition, high blood pressure, palpitations or are pregnant, talk to a clinician before changing anything. - Suicidal thoughts: 988 (call or text). Crisis Text Line: HOME to 741741. SAMHSA: 1-800-662- 4357. - See “The 12 Safety Rules” for shared rules.

What it does and why it hooks people

Caffeine blocks adenosine, the brain’s “tired” signal. **[Established]** Sleep is when adenosine and other waste are cleared and repair happens, so late or heavy caffeine borrows energy against tomorrow’s sleep. The slump after a dose is often the tail of that dose; a second or third dose late in the day to fight it borrows directly against tonight.

The Kernel says the effect depends on two genes: - **CYP1A2** (how fast you clear caffeine). Slow metabolizers keep it for around 7 to 9 hours, so a mid-afternoon drink is still active at midnight. - **COMT** (how fast you clear dopamine and stress chemicals). The “Sage” (slow COMT) is amplified by caffeine; the “Warrior” (fast COMT) tolerates it better and is more drawn to stimulants. **[Kernel hypothesis]**

Danger points

Danger	What to know
High doses in slow CYP1A2 metabolizers	Elevated cardiovascular risk. The Kernel’s example is very large energy drinks, or several a day. [Kernel rule of thumb; the size of the genetic effect varies]

Danger	What to know
Powders and pills	Easy to overdose.
Energy drinks	Large doses, added stimulants, and B-vitamin blends with synthetic folic acid (the Kernel advises people with MTHFR variants to prefer methylfolate).
Stacking	Layering caffeine with yohimbine, synephrine or other stimulant supplements, or with cocaine, meth or prescription stimulants, without knowing your CYP1A2 and COMT status.
Drug interactions	CYP1A2 also clears some prescription drugs; check any new medication. **Quitting smoking can raise caffeine levels** (smoke speeds its clearance), and can raise blood levels of clozapine, olanzapine and theophylline; coordinate with a prescriber before a quit date.
Substitution Danger	Caffeine is not a neutral bridge when recovering from another substance. It adds What to know stress-axis activation to a system that may already be running hot, and late use undermines the sleep that repair depends on. Alcohol used as a sleep aid suppresses REM and risks a second dependence.
Pregnancy, heart conditions	Ask your clinician what amount is safe for you.

General medical information (not from the Kernel): widely cited guidance is that moderate daily intake is not linked to dangerous effects in healthy adults and pregnancy advice is lower. These are population figures; your limit, especially with a slow CYP1A2 result or heart condition, may be much lower. Ask your clinician for your own ceiling.

Getting safe: the medical picture

Cutting down is not dangerous the way alcohol or benzodiazepine withdrawal is. *General medical information:* caffeine withdrawal is a recognized condition: headache, fatigue, low mood, poor concentration and irritability, starting about a day after the last intake, peaking within a day or two and usually fading within about a week. Cutting down gradually is generally milder than stopping at once. Ask a clinician for a plan if you have heart symptoms, a severe headache, a heart condition or pregnancy.

Ask whether your focus or fatigue needs its own evaluation (ADHD, sleep disorders, iron, thyroid, depression), since caffeine may have been covering something.

The first weeks

Know your pattern. For a week write down every source (coffee, energy drinks, pre-workout, tea, cola, chocolate, pills), the amount if you can tell, and the time. Then ask what it was doing for you: - **Energy or engagement** (the understimulated Warrior). - **Getting through the day on too little sleep:** the most common answer, and the one caffeine hides rather than fixes. - **Calm through fatigue** (the Sage powering through anxiety and poor sleep). - **Focus** (possible untreated ADHD).

Cut back and re-time (the Kernel's rules of thumb, in priority order): 1. **No caffeine after noon** if you are a slow CYP1A2 metabolizer (and a good rule for anyone with sleep trouble). 2. **A lower daily ceiling** for slow metabolizers, no very large energy drinks, no stacking, no layering stimulant supplements. Your clinician sets your number. 3. **During early reconstruction after another substance,** reduce or eliminate caffeine; the Kernel says it raises excitatory activity and lowers GABA function in a system already out of balance. 4. **For a Sage,** aim lower still, toward none.

Repay the sleep debt. Sleep is the highest-priority repair, with a fixed wake time and a real wind-down. Regular meals with protein and fat (a glucose crash triggers cortisol and anxiety) and enough water also help; dehydration amplifies anxiety and craving. **One tension in the Kernel.** Its Bartender's Friend material includes coffee-based drinks for dopamine-deficit profiles. Treat those as a choice for a Warrior in stable recovery, not for a slow-COMT or slow-CYP1A2 person. Some of its coffee claims are shaky: coffee is not a meaningful tyrosine source, caffeine is cleared by CYP1A2 (not CYP2D6), and cold brew being slower-acting is unconfirmed.

Rebuilding

Build energy and calm without it: - **Energy:** vigorous exercise (even 20 to 30 minutes) is the fastest natural dopamine and norepinephrine activation; a cold shower can help. A supplement stack is not an acute energy substitute. - **Stable base:** regular meals, water, morning light. - **Warrior:** real intensity (competition, mastery, exercise). - **Sage:** calm practices (meditation, nature, routine, a low-caffeine life), and anxiety management as the central pillar.

Watch for swaps. If caffeine drifts to alcohol for sleep, or to nicotine or cannabis, name it early. The Kernel treats energy drinks and nicotine as entry points to harder stimulants for the Warrior and caffeine as an amplifier for the Sage. Managed, non-escalating caffeine can be a legitimate tool for some people in stable recovery, but not a substitute for the thing you left.

Quarterly check. Is the noon cut-off holding? Is the ceiling kept? Is sleep (falling asleep within about 20 minutes, waking refreshed without an alarm) and anxiety holding? Have I used caffeine, alcohol or cannabis more than baseline?

Genetics and tests

[Kernel hypothesis; the CYP1A2 caffeine effect is supported in the wider literature though its size varies. COMT-and-caffeine advice is the Kernel's own inference.] Do not delay changes for results; the timing rules can start today.

Finding	Suggested meaning
CYP1A2 slow (rs762551 "CC") + COMT Met/Met	Worst case: caffeine acts as a strong stressor; cut sharply or stop; none after noon.
CYP1A2 slow alone	Longer half-life; higher cardiovascular risk at high doses.
COMT Met/Met (Sage)	Caffeine amplifies overstimulation; reduce or eliminate; build calm.
COMT Val/Val (Warrior)	Better tolerance; the cut-off still applies; intensity should come from exercise and mastery.
MTHFR variants	Avoid synthetic folic acid in energy drinks.
DRD2 A1	Build several reward sources.

Without tests: severe caffeine anxiety, overstimulation and past preference for depressants suggest slow COMT; thriving on deadlines and feeling flat without challenge suggest fast COMT. Very jittery from a small amount, or unable to sleep after an afternoon coffee: tell your clinician.

Milestones (Kernel-based projections; no caffeine timeline exists in the Kernel)

When	Focus	Expected
0 to 3 months	Pattern, ceiling, cut-off, no energy drinks; sleep debt repaid; heart symptoms raised	Withdrawal fades in about a week (general medical knowledge); sleep improves first; anxiety eases.
3 to 12 months	Own energy from movement, Falling asleep and waking meals, water; swap watch	without an alarm become normal.
Years 1 to 2	Quarterly check; sustainable work rhythm	Habits, not effort.
Year 3	Yearly blood-pressure check; supplements (if any) to upkeep	Maintenance.

When	Focus	Expected
Year 5	Deadlines and travel are the triggers; keep the cut-off; share what worked	Modest Manning.
Year 10	Noon cut-off and ceiling stay	Your enzymes do not change. Recheck interactions with any new medication.

The Kernel does not promise that caffeine must be zero; the right amount depends on constitution, and for some people it is none. Everything here beyond the first weeks is projection.

FOR CLINICIANS

- Ask about total caffeine from all sources (energy drinks, pre-workout, pills, powders), timing, and sleep, anxiety and palpitations.
- Slow CYP1A2 and drug interactions (some antidepressants, antipsychotics such as clozapine and olanzapine, theophylline); smoking cessation raises caffeine exposure and can raise levels of CYP1A2 substrates.
- Pregnancy, arrhythmia, hypertension: individualized limits.
- Consider ADHD, sleep disorders, iron, thyroid and depression as drivers; screen for concurrent stimulant or alcohol use.
- Caffeine withdrawal is a recognized diagnosis; gradual reduction is gentler.

For families and supporters

- Do not shame; frame it as sleep and anxiety management.
- Help remove powders and very large energy drinks from the house, especially with teenagers.
- Support a fixed bedtime and an afternoon cut-off.
- Watch for racing heart, vomiting, fainting or confusion: Poison Control or 911.
- Notice swaps (alcohol for sleep, nicotine, cannabis).

KEY POINTS

- Powders and concentrated pills are the dangerous form; avoid them.
- Sleep is the thing at stake: set a noon cut-off and a personal ceiling with your clinician.
- Know your CYP1A2 and COMT patterns, but start today without test results.

- Do not use caffeine to power through recovery from another substance.
- Expect about a week of headache and fatigue when cutting down; do it gradually.
- Check interactions when quitting smoking or starting a medication.

CLUB DRUGS AND CATHINONES

MDMA (Ecstasy, Molly)

> **In this chapter.** MDMA is a serotonin drug that borrows a feeling of open-hearted connection and then bills you for it. Withdrawal is not medically dangerous, but the serotonin dip can be deep. Recovery means treating the depression that may surface, and rebuilding connection through things your nervous system can do on its own. This chapter is US-centred; see “The 12 Safety Rules” for the shared rules.

Emergency box - **Overheating:** very hot skin, sweating has stopped, confusion, muscle rigidity. **Call 911.** Move to a cool place, remove extra clothing, put ice packs at neck, armpits and groin. Do not wait to see if it passes. - **Water intoxication:** severe headache, vomiting, confusion or seizure in someone who has been drinking lots of water and not urinating. **Call 911. Do not give more water.** Too little and too much water can both kill. Sip; don’t gulp. - **Serotonin syndrome:** agitation, confusion, racing heart, twitching or rigid muscles, high temperature. Most likely when MDMA meets an SSRI, SNRI, MAOI, tramadol or a triptan. **Call 911.** - **Unknown contents:** “MDMA” is often PMA/PMMA, methamphetamine, fentanyl or a synthetic psychedelic. If breathing is slow or the person can’t be woken, give naloxone and call 911. - **Crisis:** 988 (call/text). Poison Control 1-800-222-1222. SAMHSA 1-800-662-4357. Crisis Text Line: text HOME to 741741.

What it does and why it hooks people

- MDMA floods the brain with serotonin, releases oxytocin (the bonding hormone) and adds a smaller dopamine and norepinephrine effect. **[Established]**
- That is why it feels like love and ease rather than just energy. The state was real neurochemistry. It was also borrowed rather than built.
- The Kernel calls this the one substance whose main gift was connection, not stimulation, calm or escape. Recovery therefore aims at serotonin and connection, not at dopamine the way stimulant recovery does.
- **The cycle.** Early use is social and tied to music and community. Use tightens, tolerance grows and the comedown deepens. Use then becomes private and is needed just to feel connected. The drug that opened people to others ends up isolating them.

- **The comedown ("Tuesday blues").** Serotonin stores take roughly two to three days to rebuild after a hit. Low mood, fatigue, anxiety and flatness are a scheduled pharmacological effect, not proof that sober life is grey. Using again to end the comedown is the main trap in the cycle.
- Heavy, frequent use is linked to lower serotonin transporter levels on imaging, with partial-to-substantial recovery over 12 to 24 months of abstinence. Findings vary by dose and pattern, and the evidence for occasional use is less clear. [Established for heavy use; Emerging for lighter use]

Danger points

Danger	What to know
Overheating	A leading cause of MDMA deaths. Dancing and hot rooms add to it.
Water intoxication	MDMA makes the body hold water. Women may be more vulnerable.
Serotonergic drugs	MDMA with SSRIs, SNRIs, MAOIs (including high-dose St. John's wort), tramadol or triptans can be fatal. SSRIs also dull MDMA's effect, which can lead people to take more.
Adulterants	PMA/PMMA is slower to start, so people redose, and it overheats people at lower amounts. Test kits and fentanyl strips help but are not complete. See "Unknown supply" below.
Slow metabolizers	If MDMA always hit harder or lasted longer than for friends, you may clear it slowly (CYP2D6). Your exposure was higher than your dose history suggests. [Established that CYP2D6 matters; individual impact varies]
Redosing mid-session Danger	A second dose has less serotonin to work What to know with. It adds mainly risk, not the feeling being chased.
A break is not a reset	Tolerance to the dangerous effects falls during a break, and the old pathways are quieter, not deleted.

Unknown supply (dated note). Fentanyl and, increasingly, nitazenes appear in counterfeit pills. Fentanyl test strips do not reliably detect nitazenes. Naloxone does not reverse xylazine or medetomidine, and nitazene overdoses may need repeated naloxone doses. Always call 911. This is accurate as of late 2026 and the supply changes.

If you are not ready to stop: test what you have (reagent kits, fentanyl strips or a drug-checking service). Never redose a slow pill before testing. Use no serotonergic medication with it. Watch for overheating and over-drinking. Carry naloxone and never use alone. A much longer gap between uses lowers risk.

Getting safe: the medical picture

- **Triage first.** Tell your prescriber about every medicine, supplement and substance you take, and your last-use timing.
- **Mood plan.** If you have a history of depression, or used MDMA to feel emotionally normal, stopping can unmask a clinical depression. Have a psychiatric plan *before* you stop.
- **Don't change antidepressants on your own.** If an SSRI is prescribed, don't use MDMA.
- **At 4 to 6 weeks,** if depression is still clinical despite good basics, get a psychiatric evaluation.
- **Other checks:** a cardiac assessment if you had overheating or heart symptoms; a neuropsychological assessment if memory or planning problems persist past 3 months; multi-site STI testing if you used in sexual settings (see the Chemsex chapter).
- **5-HTP: the single rule.** 5-HTP (and tryptophan) are only for use on a physician's advice, never with any serotonergic drug, and never both together. The Kernel's own sources give start times from 24 hours to 5 days after last use. When sources disagree, the most conservative applies, and your physician confirms the timing. Dose with your clinician or pharmacist. Check every supplement with an interaction checker.

The first weeks

When	What to expect	What helps
Days 1–3	Low mood, fatigue, anxiety, social withdrawal, sensitivity, poor concentration	Rest, food, fluids, no "fix" dose
Week 1 (the serotonin floor) When	Flat mood, possible feeling of unreality, poor memory What to expect	Daily exercise, 20+ minutes of outdoor morning light, What helps brief low-demand contact with people
Weeks 2–8	Slow improvement with big swings; sleep normalises	Keep the routine. Don't judge by single days
Vivid dreams	REM rebound as sleep stages recover	Expected, not a warning sign

Low mood after MDMA is a medical problem. If you feel unsafe, call or text 988.

Rebuilding

The craving is for connection. The strongest triggers are not the pill. They are social settings where connection feels out of reach, MDMA-linked music and events, contact from the using community, and the comedown itself ("I just want to feel normal"). The interrupt has to meet that need.

5-minute interrupt 1. Name the exact craving (disconnection? comedown? music? nostalgia?).

2. Six slow cycles of 4-7-8 breathing. 3. Take any support your physician has cleared. 4. Make real contact with one person, by call or in person, not the group chat. 5. Do something that raises natural serotonin (movement, laughter, music with others). 6. Ask whether the setting suits early recovery. Some are too risky in the first six months. 7. Write down trigger, state, intensity, action and outcome.

The connection architecture is the central project, and the one standard treatment most neglects. It is the Kernel's idea of natural architecture: rebuild serotonin and oxytocin through the pathways your body owns. **[Kernel hypothesis]** - Deep one-to-one conversation, lowering the mask gradually. - Safe touch: hugs, pets, massage, group physical activity. - Moving in sync with others: dance, group exercise, martial arts, team sport. - Live music and active listening. It is still profound sober, different and not less. - Scheduled laughter and play. - Service. For many people it becomes the most reliable source of open-hearted presence. - Morning outdoor light.

Renegotiate the scene. The festival world also had real values (peace, love, unity, respect), music and friends. Part of the closeness was chemical; part was real. Keep what you can: the music in sober settings, friendships on sober terms, the values. Renegotiate any space where use is active and expected, and any friendship whose only currency is the drug. That distance is temporary, not exile. Build a recovery playlist.

Treat what it was treating. - Depression: see above. - Social anxiety: needs its own treatment, which may include a non-addictive medicine or therapy. - PTSD: trauma-specific therapy (EMDR, CPT or Prolonged Exposure). - ADHD: non-stimulant treatment is the Kernel's preference. Stimulant treatment needs a careful risk-benefit review.

Identity. Was the open, loving person on MDMA your real self or the drug? The Kernel answers: both. The drug opened something real, and recovery builds direct access to it.

Therapeutic MDMA: status and caveat

Dated caveat, checked September 2026. Verify before relying on it. MDMA-assisted therapy for PTSD has been authorised for prescribing in Australia since July 2023. In the US, the FDA declined approval in August 2024 and asked for more evidence. A resubmission was reported in August 2026. US access is otherwise limited to clinical trials and expanded access. It is not an available treatment you can obtain in a typical US clinic.

If PTSD drove your use, any decision belongs to an addiction medicine specialist and a psychiatrist working together, with full disclosure of your MDMA history to the therapy team and your CYP2D6 status known.

The person most likely to benefit and the person most likely to be harmed can be the same person. That is neither a reason to exclude it nor to pursue it without full oversight. Supervised therapy is a different context from recreational use.

Genetics and tests

Do not delay starting for test results. [Kernel hypothesis unless noted] - **CYP2D6** is the priority: slow metabolizers may build up MDMA, raising overheating, serotonin syndrome and toxicity risk at doses others tolerate. [Established that the enzyme matters; Emerging for individual prediction] - **SLC6A4 short/short:** may mean a bigger surge, deeper depletion and worse comedowns. - **MTHFR and TPH2:** may mean a slower serotonin supply. Ask your clinician to assess MTHFR before a new SSRI trial. - **COMT, HTR2A/2B, BDNF:** shape the dopamine side, receptor sensitivity and repair speed. Exercise matters most for BDNF. - Order a standard variant (VCF) whole-genome test, not a methylation assay. - *No test replaces history.* "MDMA always hit me harder" is useful information on its own.

Supplements. The Kernel's order is methylation support (folate, B12, active B6, magnesium), then precursors under physician guidance, then antioxidants, omega-3 and inositol, then a dopamine layer after serotonin. The antioxidant "neuroprotection" claims rest mostly on animal data. **[Emerging]** Statements that methylfolate is "transformative" are [Kernel hypothesis]. Peptides (BPC-157, Selank, Semax, Epitalon) are research compounds: physician- only. Dose everything with your clinician or pharmacist.

Milestones

Kernel projections, not trial results.

When	Focus	Expected
0–3 months	Comedown, serotonin floor, depression check, connection habits	Uneven improvement; recreational users often much recovered in mood and warmth by months 1–6
3–12 months When	Scene renegotiated; treatment of underlying conditions; labs Focus	Mood, emotional range and sleep steadier; residual blunting in heavy users Expected
Year 1–2	Community built; identity work	Imaging recovery of serotonin transporters over 12–24 months (substantial, not always complete)
Years 3, 5, 10	Medication review, loneliness as trigger, service	Extrapolation: stewardship, standing safeguards

The Kernel's one projection (an archetype profile, not a trial): 68% cessation or major reduction at 12 months with its full protocol versus 35% with standard care. Treat as a Kernel projection. Standing rule at every stage: serotonergic medicines and MDMA do not mix, and any lapse is a medical risk.

FOR CLINICIANS

- Withdrawal is psychiatric. Screen for suicidality and unmasked depression.
- Check CYP2D6 and every serotonergic agent before any therapeutic or supplemental serotonin plan.
- Consider MTHFR before an SSRI trial **[Kernel hypothesis]**. Ask about adulterant exposures.
- Assess cognition at 3+ months, cardiac status after hyperthermia, STI risk.
- Co-occurring social anxiety, PTSD and ADHD need their own treatment.

For families and supporters

- Learn the emergency signs. Don't leave someone who is overheating or confused.
- The comedown is biology, not laziness. Expect low days in the first weeks.
- Offer connection that is not about drugs: a walk, a meal, a shared song.
- Never urge someone to stop an antidepressant to "be clean."

KEY POINTS

- Overheating and water intoxication are the quick killers. Serotonin syndrome comes from mixing.
- Pills sold as MDMA are often something else.
- Withdrawal is mainly a depression risk. Make a plan first.
- The craving is for connection, so build real connection.
- 5-HTP only on physician advice and never with serotonergic drugs.
- Therapeutic MDMA is a specialist decision, and its US status is unsettled.

Cathinones: 3-MMC, Methedrone, Bath Salts and Synthetic Cannabinoids

> **In this chapter.** Synthetic cathinones ("bath salts," "research chemicals") are stimulant-family drugs that keep changing to stay ahead of the law. This chapter covers what they share, then notes on 3-MMC, methedrone and MDPV/alpha-PVP ("flakka"). It ends with synthetic cannabinoids (Spice, K2), a different drug family sold in the same market. The Kernel's line is: "The molecule changed. The recovery was always the same." US-centred; see "The 12 Safety Rules."

Emergency box - **Call 911** for chest pain, a racing or irregular heartbeat, very high temperature, seizure, escalating agitation or paranoia, loss of consciousness, or uncontrollable twitching or rigid muscles. - **Severe agitation with overheating** (terror or aggression that won't settle, very hot skin, confusion, apparent unusual strength): call 911, cool the person (cool water, ice at neck, armpits, groin), keep your voice calm and your distance. Avoid forceful restraint, which adds to heart and heat strain. Collapse can come while agitated *or* when the person suddenly goes quiet. Don't assume they are "sleeping it off." Start CPR and use an AED if they collapse. *The Kernel's older text uses the label "excited delirium." That term is contested and no longer endorsed as a diagnosis by several professional bodies. This chapter describes the picture instead. The advice is the same.* - **Opioids in the mix** (slow or stopped breathing, blue lips): naloxone and 911. Stimulants can hide opioid sedation until it is advanced. - **Serotonin syndrome** (fever, sweating, tremor, rigid muscles, agitation, diarrhea): 911, especially with methedrone plus an antidepressant. - **Synthetic cannabinoids:** nothing reverses them. Call 911 for seizure (even on a first use), severe paranoia or psychosis, chest pain with a racing heart, flank pain with little urine, or overheating. - Tell responders exactly what was taken, including prescriptions. - Crisis: 988 (call/text) · Poison Control 1-800-222-1222 · SAMHSA 1-800-662-4357 · Crisis Text Line: text HOME to 741741 · Never Use Alone 1-800-484-3731.

What these drugs do and why they hook

- **Cathinones** are made from the same chemical family as khat. They raise dopamine, norepinephrine and (for some) serotonin by blocking reuptake and/or forcing release. **[Established]**
- **"Bath salts" and "Spice" are categories, not substances.** The compound and the dose are always unknown and keep changing. Each new generation tends to be more potent and less studied. No harm-reduction habit makes an unknown compound safe, apart from not using it.

- The Kernel's family map:

Compound	Character	Defining risk
3-MMC (metaphedrone) Compound	Dopamine/norepinephrine with some serotonin; effects Character fade within about an hour	Compulsive redosing; cumulative heart strain Defining risk across a binge
Mephedrone (4-MMC)	Similar, a little longer	Redosing, heart strain
Methylone	MDMA-like	Serotonin overload with other drugs
Methedrone (bk-PMMA)	Serotonin/norepinephrine heavy, weak dopamine; slow onset; long half-life	Narrow margin; interactions
MDPV, alpha-PVP (flakka)	Pure dopamine/norepinephrine, no serotonin "brake"; very potent; half-life 30–60 min	Psychosis, overheating, binges lasting days

- **Why they hook.** Short-acting ones pack many "redose or not?" decisions into each hour. The pull to redose is a feature of the molecule's speed, not a character flaw.
- **Often a structural choice.** Poverty and cheap supply (flakka in Florida, 2014–2016), club and chemsex scenes, and drug testing in prisons, probation and jobs pushed people toward these products. Recovery has to deal with that context as well as the chemistry.

Danger points

- **Binges, not single doses.** Each redose adds to cumulative strain on heart, temperature and brain. There is no safe redosing interval for these drugs, and this chapter gives none.
- **Mixing.** Combination toxicity is the leading pattern in 3-MMC deaths, most often opioids plus other stimulants. GHB, alcohol and benzodiazepines can mask warning signs.
- **Opioid adulteration.** Fentanyl has been found across cathinone supplies. Test strips miss nitazenes. Naloxone does not reverse xylazine or medetomidine (dated note, late 2026).
- **Psychosis.** Paranoia and hallucinations are more likely with pure-dopamine cathinones than cocaine. A pre-existing risk (personal or family history of psychosis or bipolar disorder) raises it further.
- **Heart.** Palpitations or a fast resting heart can outlast a heavy binge by a day or two and need a check.
- **Injecting ("slamming").** Risks of HIV and hepatitis C, abscesses, vein damage. Sterile- equipment services and BBV testing exist in most cities and many are anonymous. This chapter gives no technique.
- **Stopping GHB.** If you dose GHB several times a day, never stop it suddenly. See the Chemsex chapter.

- **A break is not a reset.** Tolerance falls and risk after a break is higher than the "usual" amount suggests.

Getting safe: the medical picture

- There is **no approved medicine** for cathinone withdrawal, and no standard detox. What you can ask for: a heart assessment, medical monitoring, a psychiatric check, and support.
- **Disclose everything.** Bring a complete honest list: every substance, prescription, supplement, session length, redosing, route, any heart or seizure symptoms and any history of psychosis, bipolar disorder, high blood pressure or heart disease.
- **Levels of use.** Occasional or experimental use (levels 1–2): a check-in if anything worrying happened. Regular binges (3): physician involvement, including a heart check. Frequent, dependent or polydrug use (4): medical supervision. Don't coordinate several stops without a physician.
- **Off-label options** (bupropion, N-acetylcysteine) may be discussed, but whether they fit depends on your heart history and the rest of your picture. Decisions belong to a prescriber.
- **Don't change two things at once** (for example, quitting methedrone and an antidepressant) without medical coordination.
- **Dopamine-raising supplements** (tyrosine, mucuna and the like): not while psychotic symptoms are active. Wait for psychiatric clearance.
- **5-HTP and tryptophan:** apply the single rule from the MDMA chapter: physician advice only, never with any serotonergic drug, conservative timing. This matters most for methedrone, mephedrone and methylone.

The first weeks

Phase	3-MMC and short-acting cathinones	Methedrone	MDPV / alpha-PVP
First hours–days	Sharp crash, strong urge to redose, irritability, anxiety; days 1–5 disrupted sleep and appetite	Comedown 12–48 h: fatigue, low mood, fog; days 2–10 flat, depressive, anxious	Severe crash with pure-dopamine anxiety; psychosis may last days to weeks
Weeks 1–6	Sleep and appetite normalise; fragile mood	Weeks 2–6 sleep and appetite normalise; craving cue-driven	Sleep is the best non-drug treatment for psychosis

Phase	3-MMC and short-acting cathinones	Methedrone	MDPV / alpha-PVP
Central recovery	Sustained binge patterns: 2–6 weeks, then steady mood and sleep	Sustained use: 4–12 weeks "off between good stretches"	If psychosis hasn't cleared in 2–4 weeks with sleep and abstinence, evaluate for an independent psychotic disorder
Later Phase	Waves for months 3-MMC and short-acting cathinones	Waves up to a year Methedrone	Dopamine rebuild may run longer for MDPV / alpha-PVP the most potent compounds

Timelines are Kernel projections drawn from stimulant and MDMA knowledge. Cathinone- specific data are thin. **[Emerging]**

Persistent psychosis is a psychiatric matter. If psychotic symptoms last more than 48 hours after last use, get a psychiatric evaluation. Treatment decisions belong to a psychiatrist.

Rebuilding

What was it giving you? The Kernel's function audit: energy, sociability, confidence, a repeatable peak, escape from flatness. Each need is real and outlasts the drug.

Natural architecture **[Kernel hypothesis]** - **3-MMC and MDPV-type stimulants (the "Warrior" pull for intensity):** one demanding physical challenge with frequent feedback (competitive sport, intervals, martial arts), a skill with a fast visible feedback loop (music, craft, a game with a mastery ladder), and connection built around shared activity. Not one outlet but several. - **Methedrone, mephedrone, methylone (connection and warmth):** community that rebuilds emotional safety (group therapy, peer support, deliberately vulnerable friendships), somatic or contemplative practice, and the connection architecture from the MDMA chapter. Hyperventilation-style breathwork can provoke panic or dissociation in people with psychosis, seizure or heart conditions. Check with your clinician; start with slow breathing and grounding.

Treat the underlying condition. Untreated ADHD is common among cathinone users, and depression, anxiety and trauma too. Ask for an evaluation. Psychiatric follow-up is wise after any psychosis, since it's the condition most likely to return.

Craving interrupt (built for speed): 1. Locate it in the body. It's a body event, not a command.

2. Do something physical and demanding in the first sixty seconds (fast walk, cold water on the face, push-ups). 3. Move away from supply and the use setting. This is the most important step for short-window cravings. 4. Contact one person. Isolation is where redosing decisions happen.

5. Breathe (4-7-8, several cycles). 6. Write it down: trigger, intensity, action, outcome.

Plan how a binge ends before you need to. There's rarely a "last dose." Decide in advance who you will tell, what leaves your reach and what you'll do in the hour after.

Genetics and tests [Kernel hypothesis; do not delay starting] - COMT Val/Val and DRD2 A1 (reward-deficiency hypothesis) are linked in the Kernel to drive for intensity. COMT Met/Met plus pure-dopamine cathinones is described as the highest psychosis-risk pairing. [Emerging/mixed] - DAT1 10-repeat is linked to ADHD, so ask for an ADHD evaluation. MTHFR, BDNF and (for methedrone) CYP2D6, SLC6A4 and MAOA complete the panel. - For methedrone, a slow CYP2D6 metabolizer may carry interaction risk longer. Tell every prescriber.

Substance-specific notes

3-MMC

- Effects arrive in minutes and fade within about an hour. The hardest hour is the one right after the last dose. Plan that hour.
- Get your heart checked first, especially if you had palpitations or chest discomfort.
- Opioids "to come down" are the Kernel's highest-priority risk: carry naloxone, never use alone.
- If chemsex is involved, apps down within 24 hours (see Chemsex).
- No dosing or interval guidance is given. Any number would misrepresent an unpredictable risk as manageable.

Methedrone

- Its structure is closer to PMA/PMMA, which have a long record of deaths out of proportion to use, than to mephedrone. Reported blood levels in fatal and survived cases overlap, and the half-life is reported to be roughly a day, with weak MAO- inhibiting activity. These come from lab studies and a few toxicology reports. [Emerging; treat as approximate]
- The most dangerous moment of stopping is often an uncoordinated interaction, not withdrawal. High-risk partners: SSRIs, SNRIs, MAOIs, tramadol, dextromethorphan, triptans, St. John's wort, other serotonergic drugs (including ones you recently stopped). **A prescribed MAOI with methedrone is a life-threatening combination: contact the prescriber immediately.**
- Serotonin-syndrome watch applies during use and for at least several days after.
- Don't wait for a slow onset and then redose. The product may not be methedrone. Reagent kits show a cathinone is present but can't confirm which one.
- Disclosure is protective. Isolation and secrecy raise risk.

MDPV and alpha-PVP (bath salts, flakka)

- Cravings convert to use within minutes. A “flakka binge” can run days with redosing every half hour.
- Highest psychosis risk of the family. Sleep in a dark, quiet, safe place is the best non- drug treatment.
- Emergency care for agitation with overheating (see box). Hospitals treat severe agitation with sedatives; doses and choices belong to clinicians.

Synthetic cannabinoids (Spice, K2, Black Mamba)

These are not stronger cannabis. THC is a partial agonist at the CB1 receptor. Synthetic cannabinoids are full agonists, a difference of kind. **[Established]**

- **Dangers:** seizures (even on first use), psychosis that can start within minutes, severe tachycardia and heart attack in young people with no heart history, acute kidney injury (flank pain, little urine, vomiting; early treatment matters), overheating. No reversal agent exists. **[Established]**
- **Potency swings.** First-generation compounds (JWH-018) were moderate. Third- generation ones (AB-FUBINACA, 5F-ADB, MDMB-4en-PINACA) bind far more strongly, so an old “usual amount” can be dangerous. The compound is sprayed unevenly on plant material, so one part of a bag can be mild and the next can cause a seizure. Standard drug tests don’t detect most of them.
- **Withdrawal is harsher than cannabis withdrawal.** Hours 12–24: anxiety, insomnia, craving. Days 1–4 (peak): severe insomnia, sweating, nausea, vomiting, tremor, restlessness, sometimes seizure (911). Weeks 1–4: improvement with waves. Months 1– 6: substantial CB1 recovery. Seek medical supervision for severe withdrawal; clinicians can treat anxiety and seizure risk. Ask about your kidneys if you had flank pain or low urine output. Doses and choices belong to your prescriber.
- **Don’t start stimulating supplements** while psychotic symptoms are active.
- **Natural architecture** **[Kernel hypothesis]**: sustained aerobic exercise, time in nature, creative flow, contemplative practice, sleep-supporting sound (slow, steady rhythms; genres not tied to use). The Kernel says the endocannabinoid “runner’s high” is not endorphin-mediated. The evidence says both contribute. **[Emerging]** These are harder to reach early and matter more for long-term calm.
- **CBD** may soften withdrawal. [Emerging; product quality varies; ask a clinician; not a substitute for care]
- **Genetics.** CNR1, FAAH, AKT1 and COMT have been linked to sensitivity and psychosis risk. The AKT1 T/T and COMT Met/Met claims (including the Kernel’s “near-absolute contraindication”) rest on mixed evidence. [Emerging/mixed] Your clinical history (past paranoia, family psychosis) is the better guide.
- **The testing context.** Many people used synthetics to pass tests in prison, military service, drug-tested jobs and probation. If a cannabis-positive test was the fear, the Kernel’s view is that the harms of synthetics far exceed those of a positive test. Get legal advice on your own situation. Whether panels

detect specific synthetics varies by place and changes, so check locally. If the test drives cravings, plan for it, and treat any underlying cannabis use too. The Kernel also calls for advocacy for fairer testing.

- **Craving types:** an endocannabinoid-deficit craving (anxiety, restlessness), a stress or cue trigger, or a testing-driven one. Name it, then slow breathing, nature or vigorous exercise, and contact. Secrecy (no smell, no paraphernalia) removes accountability, so connection matters.

Milestones

Kernel projections only. It has no case study or percentages for these substances.

When	Cathinones	Synthetic cannabinoids
0–3 months When	Emergency plan, heart and psychiatric check, binge-end Cathinones plan, supply and cues cut	Withdrawal peak days 1–4, then waves; sleep first Synthetic cannabinoids
3–12 months	Stimulant-style dopamine/serotonin rebuilding; waves	CB1 recovery over months 1– 6; calm and creativity return gradually
Year 1–2	Underlying ADHD/depression treated; reward sources built	Maintenance; testing and stress plans
Years 3, 5, 10	Psychosis watch, medication review; triggers shift to stress and loneliness	Triggers: tests, stress. Standing rule: no unknown compound, ever

FOR CLINICIANS

- No approved pharmacotherapy; off-label options are individualized.
- Obtain a cardiac assessment and complete substance/medication list. For methedrone, screen for serotonergic agents and MAOIs.
- Persistent psychosis (>48 h) needs psychiatric evaluation; >2–4 weeks suggests an independent psychotic disorder.
- Avoid dopamine-raising supplements during active psychosis. Screen for ADHD.
- Offer BBV testing and sterile-equipment referral. For synthetic cannabinoids, consider renal function and seizure risk.
- Describe severe agitation and hyperthermia clinically, without the “excited delirium” label.

For families and supporters

- Don’t restrain a very agitated person. Call 911, cool, calm voice, distance.
- Ask what else was taken. Medication names help paramedics.
- Support disclosure to the prescriber, and don’t push anyone to stop an antidepressant.
- A quiet, dark place to sleep helps early psychosis. Persistent paranoia needs a psychiatrist, not “waiting it out.”

KEY POINTS

- The compound and dose are unknown, so every use is a gamble.
- The danger is the binge and the mix, not the withdrawal alone.
- Methedrone plus any serotonergic drug (especially an MAOI) is an emergency.
- Psychosis past 48 hours needs a psychiatrist. No dopamine supplements while it is active.
- Synthetic cannabinoids are full agonists: seizure, heart, kidney and psychosis risks, and no reversal agent.
- Plan how a binge ends, cut supply, disclose everything, and treat the underlying condition.

Chemsex

In this chapter. Chemsex means using drugs (most often crystal meth, GHB/GBL and cathinones such as mephedrone, sometimes MDMA, ketamine or cocaine) to enable or extend sex, mostly in gay, bisexual and other men-who-have-sex-with-men communities. This chapter is non- judgmental. The aim is safety, health and a life that keeps your sexuality and community. It does not ask you to leave either. The Kernel treats it as one pattern organized around sex and community, expressed through several drugs. US-centred; see "The 12 Safety Rules." For drug detail see the Methamphetamine, GHB, MDMA and Cathinone chapters.

Emergency box - **GHB/GBL is the medical emergency.** If you dose more than three or four times a day, or overnight to prevent withdrawal, **do not stop on your own**: withdrawal can cause fatal seizures and delirium within hours. Go to an emergency department. No antidote exists and naloxone does not work on GHB. - **Call 911** if someone is unresponsive or breathing slowly; for chest pain, jaw/arm pain or stroke signs (face drooping, arm weakness, sudden severe headache); a seizure; very high body temperature; or escalating paranoia or hallucinations. Roll them into the recovery position and stay. - **Stimulants hide GHB's sedation.** Someone who seems to be sleeping can stop breathing hours later. They need monitoring. - **Never combine GHB with alcohol or ketamine.** - **Injection:** fever with shaking chills, or chest pain with fever, can mean blood or heart infection. Don't wait and see. - **Possible HIV exposure:** PEP works only within 72 hours. Ask at any emergency department or sexual health clinic. - **Sexual assault:** drug-facilitated assault happens in these settings. You have the right to care regardless of what you took. RAINN 1-800-656-4673. - **Meth crash:** days 1–5 are a real suicide-risk window. Call/text 988 or text HOME to 741741. The Trevor Project (LGBTQ+): 1-866-488-7386. SAMHSA 1-800-662- 4357. Never Use Alone 1-800-484-3731.

What it does and why it hooks

- Each drug plays a role: **meth** is the engine (energy, drive, endurance); **GHB/GBL** smooths the stimulant edge and lowers inhibition; **cathinones and MDMA** supply warmth, touch and emotional closeness. [Established pharmacology; the "one architecture" framing is the Kernel's]
- **It was never only about the drugs.** Honest list of what the scene gave: freedom from sexual shame (often carrying internalized homophobia and a community's history of stigma and loss), radical acceptance and belonging, deep physical and emotional intimacy, stamina, and escape. These are real needs. They don't vanish when the drugs do, and recovery has to meet each one.

- Sexual arousal itself becomes a cue. The brain learns “arousal = the chemsex state.”
- **For many people, sober sex is not a return, it is a first.** Every intimate encounter was chemically mediated, and the nervous system never practiced contact without buffers. That is a gap in learning, not a moral failure.

Danger points

Combination or issue	What to know
GHB + alcohol	Both depress the brain’s brakes. Can be fatal.
GHB + ketamine	Rapid breathing failure and loss of airway protection. Can be fatal.
Meth + GHB	The stimulant masks sedation, so you underestimate the load. Breathing can stop hours later (2–6 h) while you appear to be sleeping. Needs long monitoring.
Cocaine + alcohol	Forms cocaethylene, more toxic to the heart than either alone. Cocaine supply often carries levamisole: fever, mouth sores or severe sore throat need a same-day blood count.
Fentanyl contamination	Reaches supplies beyond opioids. Carry naloxone (doesn’t work on GHB). Test strips miss nitazenes. Naloxone does not reverse xylazine or medetomidine (dated note, late 2026).
Ketamine	A “k-hole” is itself an emergency (vomiting while unresponsive risks aspiration). Bladder damage (frequency, urgency, pain, blood in urine) is progressive; see a urologist first. Stopping is the only way to halt it.
Stockpiling GHB	A large supply on hand is its own relapse and overdose risk.
Meth/cathinone heart events	Chest pain, irregular heartbeat, stroke signs. Call 911.
Psychosis	Paranoid delusions or hallucinations can last days to weeks. If you or family have psychosis, schizophrenia or bipolar disorder, further stimulant use is, in the Kernel’s view, a genuine contraindication. Ask for a psychiatric evaluation.
Injecting	Bloodborne viruses, abscesses, endocarditis. Sterile-equipment services and testing exist; many are confidential.

Combination or issue	What to know
A break is not a reset Combination or issue	Real abstinence repairs receptors, but tolerance is lost. Returning to a "known" amount dosed a body whose capacity has What to know changed: the mechanism behind cardiac and overdose risk after relapse.

Getting safe: the medical picture and who supervises

- **GHB comes first.** Three withdrawals run at once, but GHB is the only one that can kill in the first 72 hours. Meth and cathinone withdrawal are brutal and not medically dangerous in the same way.
- **Self-check** (any "yes" means medical detox, not self-management): dosing more than three times a day; shaking, sweating or extreme anxiety when you miss a dose; ever a seizure, confusion or hallucinations without it; dosing every two hours or overnight; regular alcohol or benzodiazepine use. Even if all are "no," talk to a physician the same day before stopping.
- **GHB withdrawal** typically begins within hours of the last dose in a dependent user, with the highest-danger window roughly 12–72 hours in. No approved drug exists specifically for it. The best-evidenced option is baclofen, with benzodiazepine protocols also used in hospitals. Both are for physicians to prescribe and supervise. There is no self-directed protocol here. Taper pace is the prescriber's decision. Benzodiazepine strategy (including any cross-taper) is a specialist's choice.
- **The 30-day cliff.** A common pattern is about 5 days inpatient, then roughly 30 days of benzodiazepines as a bridge. If the supply simply ends on a date with no taper and no follow-up, relapse is common. Before you leave, **book an outpatient appointment dated before supply runs out and ask for a taper, not a hard stop.** Never stop benzodiazepines suddenly.
- **Tell clinicians your real use history.** Under-reported use leads to under-treated withdrawal. Include route (injection) and overnight dosing.
- **Meth crash and cathinone comedown:** allow them. Sleep, eat, hydrate. Don't be alone in days 1–5.
- **5-HTP and supplements:** apply the single 5-HTP rule from the MDMA chapter: physician advice only, never with any serotonergic drug. Don't add sedating GABA-supporting supplements during a baclofen or benzodiazepine taper without your physician. Dopamine-raising supplements are not for active psychosis. Peptides are physician-only research compounds.

Sexual health: first week, then lifelong

This is a health-care task, not a punishment. Ask a sexual health clinic, primary care or an HIV service. Many have chemsex-informed staff.

- **Within 72 hours of a possible exposure:** PEP (a 28-day course; sooner is better).

- **First week:** HIV test; STI panel (gonorrhea and chlamydia at urethral, rectal and throat sites; syphilis; herpes; hepatitis B and C); hepatitis B and HPV vaccination status; mpox vaccination if not immune and in an area where it circulates; an ECG and blood pressure if you used significant meth or cathinones; liver and kidney function (especially for GBL users); a blood count if you used cocaine.
- **HIV-negative:** PrEP, in daily pill or long-acting injectable forms, is highly protective when taken as prescribed. Start it before further sex. Test for HIV regularly while sexually active. If you injected, test for hepatitis C (it is curable).
- **HIV-positive:** undetectable equals untransmittable (U=U): a person with a suppressed viral load does not sexually transmit HIV. If chemsex disrupted your medication, ask your HIV provider about long-acting injectable options. If you were just diagnosed, get to an HIV clinic promptly. Treatment is effective and most people live normal lifespans.
- **STI testing at least every three months in the first year,** more if sexually active.
- **Sexual violence or assault:** you can get care, PEP and support (RAINN) regardless of context.
- **Shame:** it often predates chemsex. LGBTQ+-affirming therapy is the right setting.

The first weeks and months

Phase	GHB/GBL	Meth	Cathinones / MDMA
Hours 0–72	Medical care only. The one track that matters now	Crash: sleep, hunger, hypersomnia	Crash and low mood: rest
Days 3–7	Danger passing if managed; GABA still depleted	“The Pit”: deep depression and anhedonia; highest relapse and suicide risk (days 1–5)	Peak low mood and anxiety; emotional flatness
Weeks 1–4	Supervised taper continues	Anhedonia dominant; exercise mandatory; strongest craving is for the meth–sex combination	Gradual improvement; social withdrawal can be extreme
Months 1–3	GABA system substantially recovering; anxiety waves	Dopamine receptors recovering; flashes of real pleasure	Serotonin rebuilding
Months 3–12	Largely complete with proper taper	Dopamine near baseline	Serotonin baseline recovered

The flatline. Early recovery often brings a silence where desire used to live, roughly 1–3 months after meth-primary patterns and 3–6+ months after frequent MDMA use. [Kernel projection] The Kernel's instruction: **don't panic, don't test, don't force.** Checking whether desire has returned (including with porn) adds anxiety and delays recovery. It's a season, not a verdict. Months 1–3: no pressure; non-sexual touch, warmth and presence with trusted people. When desire returns, start with lower-stakes intimacy rather than the multi-partner, multi-day pattern. A satisfying sober sex life is possible, built step by step.

Rebuilding

Craving is for the whole state: intensity, disinhibition, belonging, escape. Triggers: sexual arousal, apps, weekend session times, loneliness, stress or rejection, people from the scene. GHB adds cravings from anxiety, from waking at old dosing times, social cues and flat anhedonic cravings.

Practical rules [Kernel guidance] - **Apps down within 24 hours and off for at least 90 days.** Reinstating them later is a deliberate decision, made in advance, with a plan and a person who knows. It's not a drift. - **Plan every Friday and Saturday for the first six months** with structured, high-intensity alternatives. Craving can appear at those hours months in. - Use block and mute on scene contacts as protection, not cruelty. Some relationships may be kept later in sober contexts; most can't be safely kept early. - Don't keep a stockpile of GHB.

Chemsex 5-minute interrupt 1. Name the whole thing you're craving (intensity? belonging? escape? intimacy?). 2. Leave the app or location. 3. Six cycles of 4-7-8 breathing. 4. Use any supports your clinician has cleared. 5. Contact someone who understands chemsex recovery. 6. Do something intense and natural (hard exercise, cold water, a competitive or creative task). 7. Write it down.

Natural architecture **[Kernel hypothesis]**: the intensity of meth and sex can be matched by several high-intensity outlets (competition, physical challenge, creative achievement, meaningful risk). Warm connection can be rebuilt through the MDMA chapter's connection practices. Don't rely on a single outlet.

Community and identity. Removing drugs without replacing community creates isolation, where relapse incubates. The Kernel's answer is a sober version of what the scene provided, built *inside* the queer community: - Crystal Meth Anonymous; SMART Recovery LGBTQ+ meetings. - Chemsex-informed health services and therapists. The Kernel calls the chemsex- informed therapist the most valuable clinical relationship in this recovery. In the US, some HIV and LGBTQ+ health organizations offer this. Ask your sexual health clinic. - Sober social spaces, sports leagues and Pride events. - If your adult sexual identity formed inside chemsex, sobriety doesn't restore a previous self. It builds one. Recovery is not identity subtraction. - Sequence trauma processing after biological stability.

Occasional extras. Alcohol is a poor substitute: using it to fall asleep suppresses REM sleep, slows dopamine recovery and can start a second dependence. Ketamine and cocaine: see above. Moving from alcohol to benzodiazepines is a particularly dangerous transfer.

Genetics and tests

Don't delay starting for results. [Kernel hypothesis unless noted] - **GABRA2** may shape GHB dependence, withdrawal and seizure risk. Tell the medical team if known. Test early if you can. - **CYP2B6** poor metabolism may mean GHB accumulates, with lower baclofen needs. **CYP2C19/3A4** affect baclofen and benzodiazepine handling. - **COMT Val/Val, DRD2 A1, DAT1** relate to intensity-seeking and ADHD. Ask for an ADHD evaluation, as meth may have been self- medication. - **COMT Met/Met plus psychosis history:** the Kernel's flagged contraindication for further meth. [Emerging/mixed] Get a psychiatric evaluation. - **MTHFR:** the claim that variants raise HIV risk through "mucosal integrity" is not an established finding. Use proven prevention (PrEP, testing, condoms where relevant). - **SLC6A4 short/short:** may amplify anxiety, shame sensitivity and the pull of serotonergic drugs.

Milestones

Kernel projections, not trial results. The Kernel has no chemsex case study, and combined patterns are more complex than any single one.

When	Focus	Expected
0–3 months	GHB detox in medical care; week-1 sexual health; apps down; weekends planned	Medical window passed; bridge ends by taper with a booked follow-up; flatline season begins
3–12 months	Sober community; therapy; labs; sober intimacy	GHB track largely complete; dopamine near baseline; desire returns
Year 1–2	Identity and inventory work; return to work	Meth dopamine recovery substantial by about 12–17 months (up to 24); GHB receptor recovery 12–18+ months
Years 3, 5, 10	Bridge closed; deliberate app decisions; mentoring; lifelong sexual health	Extrapolated. Standing rules: no mixing, no stockpile, no "known amount"

Nearest analogs from the Kernel (separate drugs, not chemsex): GHB cessation 63% vs 20% standard care; meth abstinence 62% vs 15%; polydrug cessation 55% vs 8%. These are Kernel archetype projections. Case 15 notes that 18 months to full stability is not unusual.

FOR CLINICIANS

- Triage for GHB dependence first. Use medical detox. Watch for the masking effect of stimulants. Do not discharge on a fixed-date benzodiazepine bridge without a taper and follow-up.
- Order a full sexual health workup in week 1, offer PEP within 72 hours, start or restart PrEP/ART and consider long-acting injectables.
- Screen for psychosis risk, suicidality in meth crash, ADHD, cardiac status (ECG), renal and liver function, and ketamine bladder symptoms.
- Document the full use history. Refer to chemsex-informed and LGBTQ+-affirming services.
- No FDA-approved medication for GHB, meth or cathinone withdrawal. Specialist- supervised stimulant stabilization is **[Emerging]** and not a self-directed strategy.

For families and supporters

- Learn the emergency signs and where PEP is available. Never leave someone who is hard to wake.
- Judgment pushes people into secrecy. Warmth, curiosity and practical help work better.
- Help with logistics: booking the follow-up appointment before the bridge medication ends, rides to testing, planning Friday nights.
- Don’t ask a person to give up their community or identity. Help them find sober spaces within it.
- Look after yourself. Family and partner support exists, and a chemsex-informed service can advise you.

KEY POINTS

- GHB dependence is the medical emergency. Never stop it suddenly or alone.
- GHB with alcohol or ketamine can be fatal, and stimulants hide its sedation.
- Book sexual health care in week one: HIV and STI tests, PEP within 72 hours, PrEP or ART.
- Apps down in 24 hours and off at least 90 days. Plan weekends.
- The flatline is a season. Don’t test it, and expect sober intimacy to be new.
- Recovery builds a sober life *inside* your community and does not require you to leave it.

PSYCHEDELICS AND DISSOCIATIVES

LSD

> **In this chapter.** LSD (acid, tabs, blotter) does not cause physical dependence or withdrawal. The problems it causes are different and real: a frightening trip, psychosis in vulnerable people, persisting visual symptoms (HPPD), a backlog of experiences that never got digested, detachment, and missing the altered state. This chapter covers safety first, then recovery, then rebuilding. It is US-centred; crisis numbers are for the US.

Emergency box - **Call 911** for: suspected NBOMe poisoning (seizure, overheating, racing or irregular heartbeat, collapse); someone who has lost track of what is real and cannot be calmed; anyone in physical danger (traffic, heights, water); anyone who may hurt themselves or others. - Tell the emergency team: "This person took something sold as LSD and may have been exposed to something else." - **988** (call or text) for suicidal thoughts. **Poison Control 1-800-222-1222. SAMHSA 1-800-662-4357. Crisis Text Line:** text HOME to 741741. - A bad trip alone is usually not a medical emergency, and a crowd of strangers can make it worse. Call for physical danger or a break from reality you cannot talk through.

What LSD does and why it hooks people

LSD acts mainly on the serotonin 5-HT2A receptor, at doses measured in millionths of a gram. **[Established]**

Effect	What it feels like
Quieting of the brain's self-referential "default mode" network	Loosening or loss of the sense of a bounded self (ego dissolution)
Looser sensory filtering	Visual and sound distortions, trails, patterns, crossed senses
More excitatory activity in the prefrontal cortex	Everything seems connected and significant
Plasticity changes in the days after	An "afterglow" of looser thinking and clearer perception

The first three rows are well described. The plasticity "afterglow" is plausible and still being studied. **[Emerging]**

The Kernel's own way of holding this is worth keeping: **the universe did open up, and the mechanism was the brain's filtering being turned down so that everything seemed to carry vast significance.** Both statements are true at different levels. The hard part of recovery is telling what was revealed from what was produced.

Why it is not "addiction" in the usual sense

- No physical dependence and no withdrawal. [Established]
- No dopamine reward loop like stimulants or opioids. [Established]
- Tolerance builds within days of repeated use, so daily use stops working. [Established]

Fast tolerance does not make use harmless. It changes the pattern:

- **Weekly or every-other-week use**, timed so tolerance fades between trips.
- **Rising doses** as receptors downregulate. Higher doses raise HPPD and psychosis risk. [Emerging]
- **An integration backlog.** About one trip a week for six months is roughly 24 to 26 experiences arriving faster than anyone can make sense of them.

Typical timeline of one experience

Phase	Roughly when	Notes
Onset Phase	30 to 120 minutes Roughly when	Easy to mistake for "not working" Notes
Ascent and peak	Hours 1 to 6	Peak mostly in hours 2 to 5
Descent	Hours 6 to 10	Calmer, reflective
Afterglow	Days 1 to 3	Best window for journaling and integration

Redosing trap. The slow-onset window (first one to two hours) is when a second dose turns a planned experience into a much larger one. The same pattern shows up outside drug use: a felt doubt gets read as "the plan must be wrong" and the plan is dropped. Treat doubt as information, not an order.

Danger points

Overdose. There is **no established fatal-overdose mechanism for LSD at typical doses.** That is not the same as "safe." Deaths and injuries happen through accidents, behavior while impaired, severe psychiatric crises, and contaminated supply.

Adulterated supply (NBOMe). Blotter sold as LSD is often something else. NBOMe compounds (such as 25I-NBOMe and 25C-NBOMe) are active at tiny amounts, sit on blotter paper the same way, and are far more

toxic: seizures, dangerous heart rhythms, overheating, and death at amounts that would be barely noticeable with LSD. [Established] Other novel substances also circulate, so nothing unverified is safe.

- Drug-checking helps but has limits. A reagent that turns purple means an indole is present; other indoles react too, so it does not prove the paper is LSD. A bitter, chemical, or numbing taste points toward NBOMe, but taste is not reliable. [Emerging]
- Best option: a drug-checking service or lab test where available.
- If NBOMe poisoning is suspected, call 911. Treatment is emergency supportive care (seizure control, cooling, heart monitoring).

Psychosis. A personal or family history of schizophrenia, schizoaffective disorder, or bipolar disorder with psychosis is a firm reason not to use LSD at any dose or in any setting. [Established as a clinical precaution] If LSD has triggered psychosis, **psychiatric care is the main track.** This chapter supports it and does not replace it.

Impaired behavior. Traffic, heights, and water. Physical safety overrides everything else.

Medication interactions. Some medicines slow LSD clearance (the liver enzyme CYP3A4): certain antifungals such as fluconazole, some antibiotics, and grapefruit can prolong and intensify effects. [Emerging] Tell every prescriber what you have taken. See also *The 12 Safety Rules*.

Trauma. A trauma history is a specific caution for unsupported use whatever your genes say.

If someone is having a frightening trip

For the person: - Move to a quiet, dim, familiar place. Lie down. Cut sensory input. Breathe slowly with long exhales. - Remind yourself: it is temporary and has a known length. - Do not add caffeine or other stimulants. Do not go somewhere crowded. Do not be alone.

For the sitter (one calm, sober person): - Your calm is the main help. Anxiety spreads. - Do not talk continuously and do not interpret (“this means…”). “You’re safe. I’m here. This will pass” is enough. - Anchor to the physical: a blanket, water, stepping outside, touch only with permission. - Know the timeline so you can give honest reassurance. - You decide when to escalate. Do not restrain aggressively; it increases panic and injury.

Situation	Do	Do not
Panic that will not settle	Seek medical help. Anti-anxiety medicine in a medical setting is a clinician’s call.	Do not give anyone’s leftover medicine. Do not use antipsychotics as a first response; that is also a clinician’s decision.
Lost track of what is real	Call 911 or go to an ED. Say it may be LSD-related psychosis.	Do not leave the person alone or wait it out.

Situation	Do	Do not
Near traffic, water, or heights Calmly guide away. If they	cannot be redirected, call 911.	Do not restrain aggressively.

Getting safe: the medical picture

There is **no detox** because there is nothing physical to withdraw from. The first month is about removing what keeps the problem going.

1.**Stop all LSD and every other 5-HT2A psychedelic** (psilocybin, DMT, mescaline). The receptor system cannot settle while it is being stimulated. **[Emerging]** 2.**Stop cannabis at the same time.** It is the most consistently reported worsener of HPPD and depersonalization, and many people improve within weeks of stopping. [Emerging: widely reported, mostly case-level] 3.**Repair sleep.** Screens off for two hours before bed, darkness, visual rest. Sleep is central to recovery, and the idea that it specifically restores receptor density is a [Kernel hypothesis]. 4.**Keep a short log** of any visual phenomena so you can see the trend. 5.**Do not wait for test results** to start any of this.

Who supervises: a primary care clinician or psychiatrist, ideally one who knows psychedelics. Neurology can rule out other causes of persistent visual symptoms. Addiction medicine is useful when use was compulsive. Bring the “Take to your clinician” list near the end of this chapter.

HPPD versus psychosis: the line that matters

HPPD (hallucinogen persisting perception disorder) means visual phenomena that continue while sober: visual snow, afterimages and trails, geometric or fractal imagery (especially in low light or with eyes closed), halos, intensified colors.

HPPDPsychosis

Reality testingIntact: you know these are Lost or fading not real objects

Voices, commands, Not part of HPPDTypical persecutory beliefs

PatternConsistent, similar episodesMay escalate or disorganize thinking

Altered state, ego dissolution No: perceptual symptoms May include only

Asking “is this real?” is itself a sign that reality testing is working. Lost reality testing, command voices, persecutory beliefs, or disorganized thinking that grounding does not settle need **urgent psychiatric evaluation**. This is not HPPD.

What the Kernel says about HPPD, with evidence labels:

- It is usually benign and time-limited. Most cases improve substantially over months to years with stopping psychedelics. A small minority stay clinically significant. **[Emerging]**
- **Prevalence of about 4 to 5% of psychedelic users, and the risk factors** (frequent use, high doses, mixing psychedelics, cannabis, prior anxiety, prior head injury): [Emerging: limited case-level evidence]
- Worse with anxiety, cannabis, fatigue, fluorescent light, screens, and stress. Better with time, sleep, darkness, and rest. **[Emerging]**
- For most people, accurate information helps more than medication, because fear of not knowing what is happening amplifies symptoms. [Kernel hypothesis, clinically plausible]
- Management order: stop psychedelics, stop cannabis, anxiety management, sleep, then supportive supplements (below). HPPD that worsens after four to six weeks of stopping both, or that is stable and impairing, should be evaluated by a clinician.

SPECIALIST DECISION: medication for HPPD, and SSRIs

SPECIALIST DECISION. The sources disagree on this point and the question is not settled here. Do not start, stop, or change any of these medicines on your own.

- **Clonazepam (short-term, severe cases only) and lamotrigine** are sometimes used by specialists for severe, impairing HPPD. [Emerging: limited case-level evidence] Benzodiazepines carry dependence risk and must never be stopped suddenly; see *The 12 Safety Rules*. Lamotrigine needs a prescriber and monitoring.
- **SSRIs.** One Kernel source says to avoid SSRIs in HPPD because they may worsen visual symptoms. Another says SSRIs are appropriate for depression once a related substance has stopped, and another says SSRIs mostly dampen psychedelic effects. In HPPD, the evidence is limited and case-level, and this book does not choose a side. [Emerging: limited case-level evidence] If you have depression or anxiety with HPPD, a psychiatrist who knows HPPD should weigh the benefit of treating the mood disorder against the reported risk of visual worsening.
- **Antipsychotics.** Conventional antipsychotics have been reported to worsen HPPD in some cases. Results with risperidone are mixed. [Emerging: limited case-level evidence] Antipsychotics are also essential when psychosis is present. That is a psychiatric decision.

Depersonalization and derealization

Feeling detached from yourself or like the world is dreamlike or artificial, with reality testing intact. It is driven mostly by anxiety and worsened by cannabis, alcohol, caffeine, sleep loss, and dissociative drugs.

- Grounding: slow breathing, physical sensation, cold water, exercise.
- Stop all substances, including cannabis and alcohol.

- If severe and lasting weeks: psychiatric referral for therapy designed for depersonalization/derealization. CBT-based approaches have supporting evidence. **[Emerging]** SSRIs for the anxiety component are covered by the specialist decision above.

The first weeks

When	What is going on	What helps
Days 1 to 3	Afterglow, loosened thinking	Describe first, interpret later; journal
Days 1 to 14	HPPD, if present, often most noticeable; sleep disrupted; mind still working through trips	No psychedelics, no cannabis; sleep routine; quiet routine
Weeks 2 to 8	Sensitivity normalizing; HPPD often eases; clarity begins	Therapy, community, exercise, sleep
Months 1 to 6	Receptor system largely recovered; HPPD diminishing for most	Meditation, creative work, steady routine

These are Kernel projections, not trial results. Craving is rarely physical. It is more often an existential pull: the ordinary world feeling narrow. Expect it, name it, and move on to the rebuilding sections below. **A lapse is information and a medical risk.** Ask what state was underneath it. Keep a sober sitter nearby. Get help for any frightening experience.

Rebuilding

Integration: the main work

Integration means turning raw experience into updated understanding, changed behavior, or processed emotion. It is **not** taking another trip to understand the last one. That is the trap that creates the backlog.

Signs of a backlog: - You cannot tell what the trips revealed from what they produced. - Ordinary perception has a lingering altered quality. - Anxiety without clear cause. - Trouble holding a consistent worldview. - A sense that something important was met but cannot be reached.

Toolkit: - **Journaling** in the first days (describe before interpreting; reread months later). - **A psychedelic-informed therapist** who neither treats the experience as dangerous in itself nor as all revelation. - **Community** that understands the territory (integration circles, peer support groups). The Zendo Project and HPPD-focused peer communities exist; vet any group the same way you would a therapist. - **Contemplative practice and body-based work** (yoga, martial arts, somatic therapy). - **Creative expression.**

The meaning crisis

After repeated trips, the old meanings (career, identity, relationships, belief) can feel arbitrary. The Kernel treats this as a philosophical disruption, not an illness, and sometimes as the most important work of a life. Contemplative traditions have mapped this ground for centuries. LSD gave quick access without preparation or community. Part of integration is finding the map and the people. If the disruption turns into hopelessness, severe distress, or thoughts of suicide, that is a mental-health crisis: call or text 988. A "spiritual emergency" that you cannot ground needs a clinician who knows both psychedelic experience and crisis care.

Treat what the trips were treating

If the trips were treating depression, anxiety, trauma, or a hunger for meaning, treat that directly with a clinician.

- **Anxiety:** non-addictive options exist; ask your prescriber. Avoid benzodiazepines as sleep aids.
- **Depression:** check basics (sleep, nutrition, folate status) with your clinician first; medication choices with HPPD are a specialist decision (above).
- **Sleep:** sleep routine first; ask your clinician or pharmacist about melatonin or magnesium.
- **Trauma:** trauma-focused therapy, not unsupported psychedelic use.

Supplements (for discussion with a clinician)

The Kernel suggests methylation support (5-MTHF, methylcobalamin, active B6), magnesium, omega-3, NAC, alpha-lipoic acid, and L-theanine for sleep, anxiety, and HPPD. [Kernel hypothesis; antioxidant and "neuroprotective" claims rest mostly on animal or small studies] Dose with your clinician or pharmacist, and check every addition with a pharmacist and an interaction checker, especially if you take any antidepressant or other serotonin-affecting medicine.

Building the "earned opening"

The Kernel's most distinctive idea: you cannot un-know what the state showed you, so build natural routes to its useful parts. [Kernel hypothesis: the mapping below is the Kernel's framework, not trial-tested]

What LSD gave	A natural route	Notes
Loosening of the self	Meditation, built up gradually Start with short sessions over months	
Vast significance	Deliberate awe: wilderness, night sky, scale	Awe research shows reduced self-focus; the effect is real but modest **[Emerging]**
Pattern recognition	Creative flow at the edge of your skill	Music, writing, code, art

What LSD gave	A natural route	Notes
Perspective shift	Travel, unfamiliar frameworks and cultures	
Altered physiological states	Non-sleep deep rest; supervised breathwork	See caution
All of the above	One contemplative tradition practiced consistently	Depth beats sampling

Caution on breathwork. Fast, hyperventilation-style breathwork can provoke panic, dissociation, or worse in people with psychosis history, seizure history, heart conditions, or persistent perceptual symptoms or depersonalization. Ask your clinician first. Start with meditation, non-sleep deep rest, and grounding. Be steady in ordinary states before seeking others.

Identity. The question is different from other recoveries: not "who am I without the drug?" but "what do I do with what it showed me?" The Kernel's view: the significance was the brain's own, unmasked for a while. The practices you build (meditation, creative work, awe, sustained attention) are slower than a tab and more truly yours. Watch for addiction transfer: new intense pursuits can become the next mask (see the chapter on behavioral addictions).

Therapeutic LSD: status as of 2026

- LSD was studied for alcoholism, anxiety, and depression in the 1950s and 60s, and has returned to clinical study.
- **As of 2026:** MM120 (an LSD formulation) holds FDA **Breakthrough Therapy designation for generalized anxiety disorder (2024)**, and **Phase 3 trials for anxiety and depression are under way.** It is **not approved for any use** and LSD **remains Schedule I.** Check current status before relying on this.
- **Not a route to "supervised use" for people in recovery from LSD problems.** The Kernel's position is that existing HPPD is an absolute contraindication (more 5-HT2A stimulation can worsen it) and past LSD-triggered psychosis is a contraindication. Reactivating psychological dependence needs specific assessment. Any future consideration needs addiction medicine involvement, full disclosure, HPPD clearance, psychosis-risk assessment, and an integration plan beyond standard protocols. Not a categorical exclusion, but a categorical requirement for care.

Genetics and tests

Never delay starting recovery for test results. None of this changes the first steps.

All of the following is **[Kernel hypothesis]** unless stated; genotype does not predict who you are or whether you will have a problem. Clinical history is the better guide.

Result	Kernel's reading
HTR2A high-expression variants	More intense experiences at the same dose; possibly higher HPPD risk. Not on standard consumer panels.
COMT Met/Met with DRD2 A1	The Kernel's highest-risk psychosis combination; neither alone defines it. Genetic evidence for psychosis risk is mixed **[Emerging]**.
COMT Val/Val	Possibly lower psychosis risk and a less profound experience at the same dose.
MTHFR variants	Possibly lower baseline serotonin synthesis; supports a methylation-aware plan.
SLC6A4 short/short	Possibly higher serotonin sensitivity and stronger emotional opening.
FKBP5 / stress-response variants	Possibly harder integration, especially with trauma.
CYP3A4 / CYP2D6	Metabolism and interactions; the practical point is to review medicines (see above). **[Emerging]**

Before results arrive, ask: did LSD hit harder for you than others at the same amount? Any family history of psychosis or bipolar disorder? Did visual phenomena persist between uses? If you order testing, check what the lab actually provides: standard variant calling (not a methylation-only assay).

Milestones

All rows are **Kernel projections**, not trial results. The Kernel has no LSD case study and gives no 12-month percentages.

Time	Focus	Expected
Days 1 to 14	Stop psychedelics and cannabis, sleep, journal	HPPD, if present, most noticeable; sleep disrupted
Weeks 2 to 8	Integration begins, therapy	HPPD often eases; clarity begins
Months 1 to 6	Contemplative and creative practice	Receptor system largely recovered; HPPD diminishing for most
Months 6 to 24+	Ongoing integration; identity work	Most HPPD substantially resolved; a small minority persist

Time	Focus	Expected
Years 3 to 5	Maintenance; mood decisions; deepening practice	Backlog cleared; triggers shift to meaning and loss (extrapolation)
Year 10	Stewardship; small set of standing safeguards	The psychosis precaution holds for life (extrapolation)

What worsens outcomes: ignoring psychosis history; continuing cannabis; using again to make sense of the last trip; skipping integration; mistaking psychosis for HPPD; sleep loss, anxiety, caffeine, and late screens; medication changes without HPPD awareness; untested blotter.

FOR CLINICIANS

- Screen for personal and family psychosis or bipolar history before anything else. Separate HPPD (intact reality testing) from psychosis.
- Ask about cannabis, sleep, anxiety, caffeine, and all psychedelics. Review CYP3A4 inhibitors.
- HPPD pharmacotherapy (benzodiazepines, lamotrigine, SSRIs, antipsychotics) rests on limited case-level evidence. Decisions are individualized.
- Suspected NBOMe exposure: treat as sympathomimetic toxidrome with supportive care; confirm with toxicology where possible.
- Be cautious with hyperventilation-style breathwork recommendations.

For families and supporters

- A frightening trip: stay calm, stay with them, keep it quiet and dim, do not interpret. Call 911 for physical danger, suspected NBOMe, or lost contact with reality.
- Do not give your own medicines to calm someone.
- Learn the difference between HPPD (“I know it isn’t real”) and psychosis (voices, commands, persecutory beliefs).
- Support sleep, no cannabis, and a therapist. Do not argue about the meaning of the trips.
- A lapse is information, not a verdict.

Take to your clinician

- An honest account of use: how often, how sourced, other psychedelics or cannabis, frightening experiences.

- Any personal or family psychosis, schizophrenia, or bipolar history, and any time you lost track of what was real.
- Any persistent visual phenomena or detachment, described specifically.
- Every medication and supplement, especially antibiotics, antifungals, antidepressants, antipsychotics.
- What the trips were treating, and whether a psychedelic-informed therapist can help.

Resources (US): HPPD Online, Zendo Project, MAPS.

KEY POINTS

- LSD has no physical dependence or withdrawal. There is no established fatal-overdose mechanism at typical doses, but blotter may contain NBOMe, which can kill.
- Psychosis history is a firm stop. Lost reality testing is an emergency, not HPPD.
- Stop all psychedelics and cannabis, repair sleep, and log symptoms.
- HPPD medication, SSRIs, and antipsychotics: **specialist decision**, limited case-level evidence.
- Integration, not abstinence alone, is the main work. Do not use LSD to make sense of LSD.
- Therapeutic LSD, as of 2026: Breakthrough designation and Phase 3 trials, not approved, still Schedule I.

Psilocybin

In this chapter. Psilocybin (“magic mushrooms”, truffles, edibles, microdosing) causes no physical dependence and no withdrawal. The real problems are psychological: unprocessed experiences, a psychosis risk in vulnerable people, lingering visual symptoms, a flat-feeling sober world, and compulsive microdosing. This chapter also covers a danger that has nothing to do with the drug itself: poisonous look-alike mushrooms. It ends with where therapeutic psilocybin stands as of 2026. Content is US-centred.

For the shared rules on medications, relapse and supply, see the Handbook chapter “The 12 Safety Rules”. Psilocybin’s close relative is covered in the LSD chapter, and much of that chapter (HPPD, integration, natural access) applies here too.

Emergency box

WILD MUSHROOM POISONING CAN KILL. Never forage mushrooms, and never identify one by how it looks. Deadly species (for example the death cap, which contains amatoxins) can be mistaken for psilocybin mushrooms. Cooking, drying or freezing does not make a poisonous mushroom safe. Symptoms of amatoxin poisoning can be delayed by many hours and can seem to improve before the liver fails. **If anyone has eaten a wild mushroom and has severe stomach pain, repeated vomiting, diarrhea, or yellow skin or eyes: call Poison Control at 1-800-222-1222 or 911, or go to an emergency department. Do not wait for symptoms to build or “sleep it off”. Keep a sample if you can do so safely.**

Situation	Do this
Lost track of what is real, hearing voices or commands, feeling persecuted, danger to self psychiatric emergency whether or not you or others (now or days later)	Call 911, or call or text 988. This is a **used recently.**
Frightening experience, but still knows it is the drug	Quiet, dim, familiar room, one calm sober person, no fighting the experience. Call 911 only if there is danger or a break from reality. Anti-anxiety medicine is a clinician’s decision, not something to improvise.

commands, feeling persecuted, danger to self psychiatric emergency whether or not you or others (now or days later)	used recently.
Persistent visual effects, but you know they are not real	Usually HPPD, not psychosis. See a clinician; see “Lingering visual symptoms” below.
Mixing with an MAOI, tramadol or another serotonergic drug, then fever, shaking, sweating, agitation, fast heartbeat	Possible serotonin syndrome. Call 911.
Suicidal thoughts	Call or text 988. Crisis Text Line: text HOME to 741741. SAMHSA: 1-800-662-4357.

What it does and why it hooks people

Psilocybin is a compound found in many fungi. The body converts it to psilocin, which acts mainly on the serotonin 5-HT2A receptor. **[Established]** It quiets parts of the brain that maintain the ordinary sense of self and opens a window of unusual emotion, memory and meaning. [Emerging, as a mechanism]

Compared with LSD, psilocybin is shorter (roughly four to six hours versus eight to twelve). It tends to be more emotional and more personal: specific people, memories and grief rather than abstract or cosmic themes. It is also cleared by ordinary enzymes, not the liver’s CYP450 system, so those drug-interaction pathways matter less. **[Established]**

By usual addiction measures, psilocybin is a low-risk drug: no physical dependence, little of the dopamine reward that drives other drugs, and tolerance builds fast so daily use stops working. **[Established]** When it becomes a problem, it is usually in other ways:

Problem	What it looks like
Integration backlog	Experiences arrive faster than you can turn them into meaning. Anxiety, confusion, instability, even when sober.
Lingering visual symptoms (HPPD)	Visual snow, trails, halos or geometric patterns that persist.
Psychosis	In vulnerable people, a psychotic episode that outlasts the drug.
Flat sober world	Ordinary life feels grey or meaningless after profound experiences. This is restlessness, not physical craving.
Compulsive microdosing	Cannot tolerate sober days, doses creep up, or an untreated condition is being managed with it.

The Kernel's framing: the experience showed you something real, and recovery means reaching those states by routes your own nervous system provides. That is a way of thinking, not a clinical finding.

Danger points

Psychosis risk. Screen first. A personal or family history of schizophrenia, schizoaffective disorder, or bipolar disorder with psychosis is an absolute reason to avoid psychedelics, at any dose and in any setting. If psilocybin ever left you unable to tell what was real, or left symptoms after it wore off, psychiatric care is the main track and everything else in this chapter is support. A history of psychosis-like episodes matters more than any gene result.

Medication interactions. Never assume a medicine is safe with psilocybin because a guide does not mention it. - MAOIs and tramadol together with psilocybin can cause serotonin syndrome. **[Established]** - Lithium has been linked to serious reactions with psychedelics in survey reports. **[Emerging]** Ask the prescriber before any psychedelic use. - SSRIs: the Kernel says they mostly dampen psilocybin's effect rather than causing a dangerous excess. That is a reasonable reading of current knowledge but not a guarantee. Any antidepressant, mood stabilizer or antipsychotic question belongs with your prescriber. - Never combine psilocybin with a supplement that raises serotonin without clearing it first (see 5-HTP below).

Potency is unpredictable. Mushroom strength varies widely by species and batch, and some species are several times stronger per gram than the common cultivated one. A bad experience may reflect a much higher dose than you thought, so stop blaming yourself. Do not redose in the first hour because the onset seems slow: the ambiguous early window is when a second dose creates a far bigger experience than intended.

Difficult experiences. Dangerous actions during a frightening experience are the main acute risk. The drug alone is not known to cause breathing failure, heart events or overdose death at documented doses. [Established, for the drug alone] Vomiting and nausea are common. Risk rises when alone, in an unfamiliar place, in a mental health crisis, or when mixed with other substances.

Cannabis. It is the most consistently reported aggravator of lingering visual symptoms and detachment. **[Emerging]**

Wild mushrooms. See the emergency box above. Buying from known cultivated sources does not remove every risk, but foraged mushrooms carry a risk of fatal misidentification that no amount of experience removes.

Getting safe: who supervises

There is no detox and no medical withdrawal to design. Stopping is not a medical event. What does need clinical attention:

- **A psychiatric evaluation** for any psychosis history, family history, or loss of reality testing, now or in the past.
- **A prescriber review** of every medication and supplement before any future psychedelic.
- **A clinician for HPPD** if symptoms are impairing (see below).
- **An addiction or mental health clinician** if what you used it for was depression, trauma, anxiety or ADHD.

The first weeks

The Kernel's order is: stop, sleep, then integrate.

1.**Stop all psychedelics** (psilocybin, LSD, DMT, mescaline). The receptor system recovers best when it is not being stimulated. 2.**Stop cannabis** at the same time. Many people improve within weeks of stopping. [Emerging] 3.**Repair sleep.** Psilocybin disrupts sleep for days after a high-dose session. Dark, screen- free evenings, a steady schedule and less caffeine help, and anxiety and sleep loss both worsen perceptual symptoms. 4.**Keep a brief note of any visual effects** so you and a clinician can see the trend.

What to expect (Kernel projections, not trial results):

When	What the Kernel expects
Days 1-3 When	"Afterglow": a more flexible, open state. The What the Kernel expects best window for journaling and reflection. Shorter than after LSD. Avoid demanding input.
Week 1	Sleep may be disrupted. Check for visual symptoms.
Weeks 2-8	Integration is the main activity. Visual symptoms, if present, often ease.
Months 1-6	Receptor system settling, visual symptoms fading for most, meaning starting to become part of daily life.
Months 6-24+	Most visual symptoms largely resolved, integration continuing.

Lingering visual symptoms (HPPD) and detachment

HPPD means visual phenomena that continue after use: visual snow, afterimages, trails, halos, geometric patterns. The key difference from psychosis is that **you still know the effects are not real.** Asking "is this real?" is itself a reassuring sign. HPPD does not include voices, commands or persecutory beliefs.

- The Kernel puts HPPD at roughly 4 to 5 percent of psychedelic users, with risk rising with frequent or high-dose use, mixing psychedelics, cannabis, prior anxiety or head injury. [Emerging: this estimate rests on limited evidence]
- Self-management: understand it (fear amplifies it), stop psychedelics and cannabis, reduce anxiety, protect sleep.
- Detachment from yourself or the world (depersonalization or derealization) is mostly anxiety-driven and worsened by cannabis, alcohol, caffeine and sleep loss. If it persists, ask for a psychiatric referral and a therapist who knows this condition.
- **Medication for severe HPPD is a specialist decision.** The Kernel names a short-term benzodiazepine and an anticonvulsant as options for a prescriber, and warns that SSRIs and conventional antipsychotics may worsen visual symptoms. [Emerging: limited, mostly case-level evidence]
- **Kernel documents disagree on SSRIs.** One says avoid them in HPPD, another says they are appropriate once the substance has stopped, and another says they mostly dampen psilocybin. This is unresolved. Treat it as a decision for a psychiatrist who knows your history, not a rule to apply yourself.
- Any loss of reality testing, command voices, persecutory beliefs or disorganized thinking that does not settle with grounding needs urgent evaluation. Do not label it "just HPPD".

Rebuilding

Integration is the main work

Integration means turning a raw experience into updated understanding, changed behavior or processed emotion. It does not mean having another experience to make sense of the last one. That is the trap: it produces accumulation, not resolution.

Signs of a backlog: hard to tell what the sessions revealed from what they produced; ordinary perception feels altered when sober; unexplained anxiety; trouble keeping a steady worldview; a sense that something important was met but cannot be reached.

Psilocybin tends to surface specific personal and relational material, so integration is closer to psychotherapy than philosophy. The toolkit:

- **Journal within a few hours** of the experience's end. Describe before you interpret.

- **Body-based work** (somatic therapy, yoga, dance, or similar). The body holds what the mind has not processed.
- **A psychedelic-informed therapist**, ideally one who neither treats the experience as an illness nor accepts every insight as revelation. Trauma-focused methods such as EMDR may help with surfaced memories.
- **Integration circles** for peer understanding.

The four-step emotional content protocol: 1. Name the content specifically. Not "I felt sad" but "I saw my relationship with my father as a pattern of seeking approval I never received, and I grieved it." 2. Identify the real relationship, belief or pattern it points at. 3. Act on what it indicated: reconnect, grieve with support, begin the neglected work. 4. Bring the material to therapy. The experience surfaces it; therapy and time resolve it.

Treat what it was treating

Ask honestly what the sessions were giving you. For many people the answer is a real emotional, depressive or existential need that deserves proper care. If it was depression, trauma, anxiety or ADHD, get it assessed and treated directly. For microdosing in particular, see the next section.

Microdosing

Microdosing means taking a sub-perceptual amount on a regular schedule. The Kernel says it does not carry the perceptual, HPPD or psychosis risks of larger amounts. Evidence for its benefits is limited and mixed. **[Emerging]** It can still become compulsive. Three patterns:

Pattern	Response
Sober days feel flat or aversive by contrast Pattern	Plan sober periods and lengthen them gradually. Support the sober state with exercise, sleep and treatment. Response
Doses creep up until effects are noticeable	This is now ordinary low-dose use, and the full framework in this chapter applies.
It is masking depression, ADHD or anxiety that was never diagnosed	Get the condition assessed and treated directly. A prescriber decides how.
Supports and supplements	

This is the Kernel's supplement layer. **[Kernel hypothesis]** Evidence is limited and mixed, and none of it replaces assessment or treatment. Dose with your clinician or pharmacist, and check every addition against your medicines.

- **Methylation support** (folate in its active form, B12, B6, magnesium), especially if you have an MTHFR variant or low homocysteine. **[Kernel hypothesis]**

- **Serotonin support:** 5-HTP is used only on a physician's advice, never together with any serotonergic drug (including antidepressants, MAOIs and tramadol), and never soon after a session. Kernel guides disagree on the waiting period, so the physician sets the timing and the more conservative window applies. Inositol, omega-3 and EGCG appear in the Kernel's plan with limited evidence. **[Kernel hypothesis]**
- **Neuroplasticity supports:** regular vigorous exercise (strongest in the first days after a session), good deep sleep, and lion's mane and NAC. Exercise and sleep are the strongest. **[Emerging]**
- **Not during active psychotic symptoms:** do not start stimulating or dopamine-raising supplements until a psychiatrist has cleared you.

Building natural access

Trial research finds that how intense the "mystical-type" experience was predicts psilocybin's benefit in supervised therapy. [Established as a trial finding, in supervised therapeutic use, not recreational use] The Kernel uses this as a map: each element of the experience has a slower, earned route.

What the experience gave	A slower route
Boundlessness, loss of self-boundaries	Regular meditation, built up over months; a systematic practice, ideally with a teacher.
Emotional openness (grief, love)	Deliberate, scheduled openness with safe people; therapy; community that holds emotional truth. The Kernel calls this the most personally demanding task.
A felt sense of insight	Sustained reading, writing as inquiry, philosophical or religious community.
Sensory beauty What the experience gave	Attentive listening, time in nature, art. Not background exposure. A slower route
Awe and flow	Nature, creative work at the edge of your skill, one contemplative tradition practiced consistently.

Caution: breathwork based on hyperventilation can provoke panic or dissociation in people with a psychosis history, seizures, heart conditions or persistent depersonalization. Ask a clinician first. Start with meditation and grounding.

The meaning crisis

Some people find the meanings that organized their lives feel insufficient after repeated sessions. The Kernel says this is not illness but a real disruption, to be held rather than solved. The question is less "who am I without the drug?" than "what do I do with what it showed me?" Therapy, community and slow practical steps help. If it brings despair or hopelessness, call or text 988.

Therapeutic psilocybin (status as of 2026)

Supervised therapeutic psilocybin is a different context from unsupervised use. It involves screening, a trained facilitator and an integration plan. Its status is moving fast, so check it fresh.

Claim	Status
Psilocybin is not FDA-approved and remains Schedule I federally.	Verified, as of 2026.
Depression: Compass Pathways' COMP360 for treatment-resistant depression has reported two positive Phase 3 trials and is under a rolling FDA submission, with a priority voucher granted in April 2026. Usona's psilocybin for major depression has a priority voucher too.	**Verified at Phase 3, as of 2026.** Still not approved.
Other conditions (OCD, alcohol use disorder, anorexia nervosa, PTSD): reported as Phase 3 or "strong evidence" in some Kernel text.	**Unverified. Verify before relying on it** (as of 2026). Early-stage research does not mean proven treatment.
FDA Breakthrough Therapy designation for depression conditions.	**Unverified in this review. Verify before relying on it** (as of 2026).
State programs: Oregon and Colorado have regulated psilocybin services.	Reported by the Kernel; **verify current rules and eligibility before relying on it** (as of 2026).
Legal options in other countries (for example retreats in Jamaica, or truffles in the Claim	**Unverified. Verify before relying on it** (as of 2026). Laws differ and change, and standards Status
Netherlands).	of care vary.

With a history of problematic use: the Kernel's position is that this is a decision for an addiction medicine specialist, the facilitator and a psychiatrist who knows both fields, with full disclosure of your history, clearance for HPPD and psychosis, and an integration plan that addresses your use patterns. It is not a categorical exclusion; it is a categorical requirement for specialist care.

Cautions: current HPPD, any past psychosis-like response to psilocybin, and a high-risk profile (psychosis in the family, plus anxious and highly reactive temperament) mean therapeutic use is contraindicated or needs a full risk assessment. Infrequent supervised sessions are not the same as repeated uncontained use, but people with compulsive patterns can find those patterns reactivated. Monitor for them openly.

Genetics and tests

[Kernel hypothesis] These are the Kernel's reading of how genes might shape experience. They are not proven to predict who will have problems. **Never delay starting for test results.** Your history matters more than any gene.

Gene or result	What the Kernel suggests
HTR2A (the receptor psilocin acts on)	High-expression variants may make the same dose feel more intense and may raise HPPD risk. Not on standard consumer panels.
COMT Met/Met with psychiatric family history	The Kernel's highest-risk profile for destabilizing experiences. Anxiety care is the priority; a full risk assessment is needed before any therapeutic use. Evidence on COMT and psychosis is mixed, so rely on clinical history.
MTHFR variants	May reflect lower serotonin synthesis capacity. The Kernel suggests assessing this before an SSRI trial; ask your prescriber.
SLC6A4 short/short, BDNF Met, FKBP5	Possible roles in emotional intensity, a weaker or shorter "afterglow", and stress reactivity. Trauma history is a specific caution.

Psilocybin is not cleared through CYP450, so those enzyme tests matter little for it (they may for your other medicines). If you order sequencing, ask for a standard variant file; "WGBS" usually names a methylation assay that cannot call variants such as MTHFR C677T. No test needed: did psilocybin feel stronger than for others at the same dose, or fix a low mood nothing else touched? Take your answers to a clinician.

Milestones

The Kernel has **no psilocybin case study and gives no psilocybin-specific outcome percentages**, so there is no 12-month projection here. The table below is a timeline of Kernel projections, not trial results.

Period	Focus
0-3 months	Psychosis screen, stop psychedelics and cannabis, sleep, integration with a therapist, HPPD watch, treat any underlying condition.
3-12 months	Integration continues; build daily practice and emotional openness; sober days feel ordinary.

Period	Focus
Year 1-2	Most visual symptoms resolved for most people (a small minority persist at clinically significant levels). Integration becomes an ongoing practice.
Year 3	Mood plan reviewed (treat depression or anxiety directly); supplements stepped down to maintenance with prescriber input, not to zero; any therapeutic decision made with specialists.
Year 5	Triggers shift from sessions to meaning and loss. Practice deepens (teacher, community, retreat). Peer support or guiding others (the Kernel's "Manning"). These later years are extrapolation.
Year 10	A few standing safeguards. The psychosis rule holds for life. Any future psychedelic decision stays with specialists.

What changes the outcome: ignoring psychosis history; continuing cannabis; using again to make sense of the last experience; skipping integration; sleep loss; a microdose that never ends; calling a psychotic episode "HPPD". A lapse is information and a medical risk: ask what state was underneath it, keep a sober sitter, and get help for any frightening experience. The Kernel does not promise zero risk or that all HPPD resolves.

FOR CLINICIANS

- Screen first for personal and family psychotic or bipolar-with-psychosis history, past psychedelic-induced psychosis or persistent symptoms, and current medications (MAOIs, tramadol, lithium, serotonergic agents).
- Distinguish HPPD (intact reality testing) from psychosis and from DPDR. Evidence for pharmacological HPPD management is limited and case-level. The Kernel's guidance on SSRIs in HPPD is inconsistent across documents: individualize.
- Physical withdrawal is not expected. Look for the psychological syndromes above and for the condition the user was self-treating.
- Ask about foraging, and about amatoxin exposure if GI or liver symptoms follow ingestion. Involve Poison Control or toxicology early; symptoms can be delayed.
- For therapeutic candidacy, the Kernel asks for addiction-medicine and psychiatric collaboration, disclosure, HPPD and psychosis clearance, and integration planning. Trial and legal status claims in this chapter outside depression are unverified.

For families and supporters

- Psychosis, command voices, or danger to self or others: call 911 or 988. Do not wait.
- After any wild-mushroom ingestion with vomiting, severe pain or yellow skin or eyes: Poison Control 1-800-222-1222 or 911.
- Be a calm, sober presence. Help find a therapist, and support sleep, routine and a cannabis-free home.
- Suspect trouble if microdosing never stops or doses climb. Encourage assessment, not shame.
- Take care of yourself too: SAMHSA 1-800-662-4357.

KEY POINTS

- Psilocybin causes no physical withdrawal; the dangers are psychosis, difficult experiences, HPPD and integration problems.
- Never forage or identify wild mushrooms. Misidentification (such as amatoxin species) can be fatal: Poison Control 1-800-222-1222 or 911.
- A personal or family history of psychosis is a firm reason to avoid psychedelics; psychosis is a psychiatric emergency.
- Check every medicine with a prescriber: MAOIs, tramadol, serotonergic drugs and lithium carry real risks. 5-HTP only on physician advice.
- Stop psychedelics and cannabis, protect sleep, and put integration and treatment of the underlying condition first.
- Only depression has verified Phase 3 evidence (as of 2026). Other indications and other- country legal claims: verify before relying on them.

Ketamine

In this chapter. Ketamine ("K", "Special K") is a dissociative anesthetic, a club drug and, in supervised form, a medicine for depression. This chapter is about problem use. The bladder comes first, then safe stopping, the "craving is the exit" idea, grounding, and treating whatever ketamine was treating. Resources are US-centred; outside the US, use your local emergency and crisis services. **Emergency box** - **Unconscious or unresponsive after ketamine: call 911.** Roll the person onto their side, stay with them, watch their breathing. Do not give other substances to "bring them out". There is no antidote for ketamine. - **Mixed with opioids, benzodiazepines, alcohol or GHB:** treat as higher risk and call 911 early. If an opioid may be involved, give naloxone if you have it, but it does not reverse ketamine. Unknown-supply pills can contain fentanyl, nitazenes or sedatives such as xylazine or medetomidine, and naloxone does not reverse the last two (see the unknown-supply guidance in the Handbook). - **Bladder warning signs: see a urologist or emergency physician now.** Needing to urinate every few minutes, severe urgency, lower- abdominal, pelvic or flank pain, blood in the urine, loss of bladder control, kidney- area pain. - **Right upper abdominal pain, yellow skin or eyes, dark urine:** possible bile-duct injury. Needs prompt medical care. - **Suicidal thoughts, or severe agitation, paranoia or confusion that does not settle:** 911, or call or text **988**. Poison Control: 1- 800-222-1222. SAMHSA: 1-800-662-4357. Crisis Text Line: text HOME to 741741.

What ketamine does and why it hooks people

Ketamine blocks NMDA receptors, a type of glutamate receptor. Glutamate is the brain's main "go" signal. NMDA receptors help with learning, memory, pain processing, mood and the ordinary sense of being one continuous self. **[Established]**

At lower doses, ketamine gives numbness, dissociation, euphoria and distorted time. At higher doses it produces the "k-hole": complete disconnection from body, identity and surroundings. In supervised settings, the same blockade has rapid antidepressant effects, possibly through a glutamate surge that raises BDNF (a growth-supporting protein). **[Emerging]**

Why people keep using it: - **Exit.** The most common pull is not the drug but escape from a present moment that feels unbearable. Many people used it for trauma, pain, anxiety or depression. - **Aliveness.** Some find the ordinary world flat next to the ketamine state. - **Connection or insight.** Others valued the expanded, boundary-dissolving states. - **Context.** Particular music, friends or late nights become cues.

Withdrawal is mostly psychological. There is no alcohol-or benzodiazepine-style seizure risk and no opioid-style physical illness. But a rebound in excitatory signalling plus the return of untreated depression can drive quick relapse, so “not dangerous” does not mean “easy to do alone”. [Established for the pattern; the details of the rebound are Emerging]

Danger points

Bladder and urinary harm (the emergency that cannot wait)

Ketamine-associated uropathy (“ketamine bladder”) is the defining physical harm of heavy use. It was first described in the medical literature in 2007. **[Established]** It is progressive. Stopping ketamine is the only way to halt it, and some damage needs active treatment even after you stop.

Stage	What is happening	What it needs
Early (irritative)	Inflamed bladder lining: frequency, urgency, painful urination	Urology, stop ketamine. Mostly reversible with stopping
Intermediate (structural)	Scarring, shrinking capacity, possible kidney involvement	Urgent urology, bladder camera exam, kidney tests. Stopping is non-negotiable
Severe (end-stage)	Contracted, shrunken bladder	Specialist surgery, possibly bladder removal and urinary diversion. Not reversible
Bile ducts (less common)	Inflamed, scarred bile ducts: upper right abdominal pain, abnormal liver tests, jaundice	Hepatology, liver tests, imaging, stop ketamine

If you have any urinary symptoms, **your first appointment is with a urologist**, not an addiction clinic or therapist. Do not wait for recovery to “settle” first.

- Urology teams may use a camera exam of the bladder, kidney tests and ultrasound, bladder-stretching procedures and instillations (medicine placed in the bladder). These are specialist decisions.
- Plan urology follow-up with your team. The sources suggest every three months for at least the first year after stopping, and the interval after that is the urologist’s call. Mention your ketamine history to every clinician for life.
- Drinking plenty of plain water is the usual supportive advice after stopping, because it dilutes what reaches the bladder lining. Ask your urologist how much suits you, especially with kidney or heart conditions.

- Bladder supplements (anti-inflammatory plant extracts and similar) are for discussion with your urologist only. Some, such as high-dose vitamin C, can acidify urine and worsen irritation. Evidence for them is limited [Emerging at best].
- Any return to use restarts the damage. A lapse is a bladder event as well as an overdose risk.

Overdose and the k-hole

Ketamine overdose is mainly an airway and aspiration problem rather than the opioid pattern. It keeps airway reflexes better than most anesthetics, but at high doses or with other depressants a person can become unresponsive, vomit without protecting their airway, or breathe poorly. Heart rate and blood pressure rise, which is dangerous with heart conditions. High doses can cause an acute psychosis that looks like schizophrenia. **[Established]**

In a k-hole, the person cannot respond, protect themselves or call for help. Panic and agitation can cause injury. Response: 1. Do not leave them alone. 2. Put them in the recovery position (on their side). 3. Clear hazards and monitor breathing. 4. If breathing becomes irregular or stops, or you cannot wake them, call 911. 5. Give nothing to “bring them out”. A full k-hole at recreational doses usually passes in 30 to 90 minutes, but never assume that is safe to wait out if breathing worries you.

Mixing: depressants, opioids, alcohol, GHB

Combining ketamine with opioids, benzodiazepines, alcohol or GHB sharply raises overdose risk. **[Established]** There is no reversal agent for ketamine, and the other drug may need its own response. If you use more than one substance, read each substance’s chapter. Do not use alone. See “The 12 Safety Rules” in the Handbook.

Redosing and planning ahead

The drug distorts your ability to judge “is this enough?”, which is why any limits have to be decided before use, not during. The same pattern shows up outside use: a doubt, a peer’s relapse or an offhand comment can be read as “the plan must be wrong”. Treat that feeling as a signal and take it to your support people rather than acting on it.

Interactions and genetics of metabolism

Some medicines and foods change how much ketamine reaches the bloodstream. Grapefruit juice, certain antibiotics and some antifungals can raise levels; St. John’s wort and some tuberculosis drugs can lower them. [Established for the general principle; ketamine-specific data are limited] Tell prescribers and pharmacists about any ketamine use.

Driving and daily safety

Do not drive, cycle, swim, cook on a hob or operate machinery while under the effects of ketamine or until you are fully clear. Impairment of judgment, balance and attention can last hours, and in heavy use “k-fuzz” can persist between sessions. Plan for a sober ride home and a sober companion.

Ketamine misuse versus medical ketamine

Medical or supervisedStreet or self-directed

Product	Esketamine nasal spray (Spravato) or IV ketamine from a licensed clinic	Unknown strength and purity, possibly adulterated
Context	Screening, monitoring, observation after dosing, integration support	None; often alone or with other drugs
Approval	Esketamine approved by the FDA in 2019 for treatment-resistant depression and in 2020 for depression with acute suicidal thoughts. IV ketamine is used off-label	Illegal without a prescription (Schedule III)

This chapter is not for people using ketamine only in supervised treatment. Three situations overlap with problem use: - Therapeutic use that has slid into self-dosing, escalation or use outside the clinic is now a use disorder, however it began. - If you are in ketamine therapy and also recovering from non-medical use, the clinic and your recovery team must know about each other. - If you have a history of heavy non-medical use and are considering clinic treatment, get specialist (addiction psychiatry) advice first. Heavy past use may change response and risk.

Getting safe: who supervises

- **Urology first** if there are any urinary symptoms (see above). Hepatology if there are liver or bile-duct signs.
- **A prescriber or addiction clinician** for the withdrawal period, especially if you use other substances or have depression, trauma or suicidal thoughts. Be honest about the form, amount, frequency and every other substance.
- **Do not use benzodiazepines to manage ketamine withdrawal unless prescribed.** Cross- dependence can develop. If you also use alcohol, benzodiazepines, Z-drugs, GHB or high-dose gabapentinoids, never stop those suddenly; that needs medical supervision.
- **Pharmacist and interaction check** for every supplement and medicine you add.

- **Psychosis, paranoia or severe confusion:** psychiatric care. Do not add dopamine-raising supplements (such as tyrosine) or stimulating herbs while psychotic symptoms are active; wait for psychiatric clearance.
- **Serotonin:** serotonin-boosting supplements such as 5-HTP are for use only on a physician's advice, and never alongside SSRIs, SNRIs or any other serotonergic drug (risk of serotonin syndrome). The sources give conflicting timing rules, so the physician decides timing.
- **Supplement doses:** dose with your clinician or pharmacist. Some people find magnesium, NAC or omega-3 helpful during the glutamate rebound, but the evidence is limited **[Emerging]** and none replaces medical care.
- **Research peptides** (BPC-157, Semax, Selank, Epitalon) appear in the source material. They are research compounds with little human evidence in ketamine recovery: physician-only, and not a self-start step.

Crisis help is listed in the emergency box. A first call to 988 or SAMHSA is a reasonable first step if you do not know where to start.

The first weeks

Expect waves, and expect the underlying problem to show up.

When	What it can look like	What helps
First 24 hours When	Anxiety, restlessness, low mood, strong craving, foggy thinking, perceptual oddness What it can look like	Quiet, low stimulation, a calm person nearby, no other substances, urology if bladder symptoms What helps
Days 1 to 5	Peak psychological withdrawal: often severe low mood and anxiety, poor sleep, vivid dreams, fog, possible feelings of unreality, and whatever ketamine was masking	**Highest relapse window. Do not be alone.** Tell someone. Medical support if mood is severe or you have any thoughts of self-harm
Days 5 to 14	Rebound easing, cravings coming in waves, real emotions (grief, anger, loneliness) returning	These feelings are evidence you are present, not that stopping was a mistake. Begin gentle exercise and grounding
Weeks 2 to 8	Fog lifting, emotional range widening, cravings less frequent	Grounding work becomes the main job

If ketamine always hit harder or lasted longer for you than for others, you may clear it slowly (see the genetics section). That is a **[Kernel hypothesis]** that could mean delayed or longer withdrawal, so ask your clinician.

Sleep: vivid, disturbing dreams are common as REM sleep returns. Keep a steady schedule, and ask a clinician about sleep aids rather than using sedatives on your own.

The craving is the exit

The Kernel's central idea: the craving is not for the drug, it is for the exit it offered. It arrives when the present moment becomes unbearable. So the job is to meet the need for relief in another way. A craving is a signal, not a sin.

Type	What it feels like	First move
Reality escape (most common)	"I can't be here"	Ground, then breathe, then cold water
Flatness / low mood	Nothing feels alive without it	Movement, light, warmth from a person; treat the depression (see below)
Curiosity	Wanting the expanded space itself	Slow meditation, creative practice; see "Building real access" below
Social / contextual	Music, friends, places or times of night	**Leave the context first**, then contact, then ground

Five-minute interrupt: 1. Name the type. 2. Ground: five things you see, four you touch, three you hear, two you smell, one you taste. 3. Slow breathing for a few minutes. 4. Cold water on the face and wrists. 5. Make one contact, a text or a call. 6. Do something in your body: walk, stretch, music, a creative task. 7. Write down trigger, type, intensity (0 to 10), action and outcome. Patterns appear over weeks and help your therapist.

Rebuilding

Grounding before expanded states

This chapter treats grounding as a priority. Before you chase any expanded state, you need to be able to stay in ordinary ones. Ketamine trains the brain to dissociate, and for some people feelings of unreality (depersonalization, derealization) outlast the drug by months.

- **Somatic and trauma-focused therapy** (EMDR, somatic experiencing, sensorimotor psychotherapy). Work with a trained clinician.
- **Daily grounding** until it is automatic.

- **Exercise as embodiment:** the goal is presence in a moving body, not fitness. Running, swimming, martial arts or dance all work if they take your full attention.
- **Safe physical contact** and company without chemicals.
- **Persistent unreality:** ask a clinician about treatment. SSRIs have some evidence in depersonalization disorder [Emerging]. Avoid cannabis and other dissociative drugs, which can worsen it.

Treat what ketamine was treating

A large share of people with problem use began partly because ketamine relieved a depression, trauma or pain that nothing else touched. It returns, often more intensely, once you stop. Direct treatment is not optional for lasting recovery.

Options to discuss with a psychiatrist or addiction clinician: - Standard antidepressants with enough time to work. The sources suggest response can be slower after ketamine use [Emerging]. - Folate-based support if a methylation variant is suspected, after clinician review [Kernel hypothesis; evidence mixed]. - **TMS** (transcranial magnetic stimulation), a non-drug treatment with good evidence in treatment-resistant depression [Established]. - Supervised esketamine or ketamine only for truly treatment-resistant depression, only with addiction- psychiatry input, never from a general infusion clinic and never alone. In one case study the Kernel poses this as a question for a psychiatrist to decide. - Trauma therapy in months 1 to 6 once you are stable. - Chronic pain: treat with a pain specialist.

Sleep, nutrition and cognition: - **Exercise** is the best-supported cognitive intervention: about 30 to 60 minutes of aerobic activity most days, built up gradually and cleared with your doctor if you have heart conditions. Fog and memory typically improve over about 3 to 12 months (memory often 3 to 6) [Kernel projection]. - Learning something hard and new (instrument, language, sport) challenges the brain in the right way. - Choline, lion's mane, omega-3, magnesium and NAC have limited or mixed evidence here [Emerging]; check with a pharmacist. SAMe can trigger mania in bipolar disorder. - A 40 Hz sound protocol is a Kernel idea with little evidence [Kernel hypothesis].

Building real access to what ketamine faked

The Kernel calls ketamine the "counterfeit sacred": it gives states people have sought for centuries (ego dissolution, unity, quiet from self-talk) without the slow building that makes them usable, and it damages the body while doing so. The Kernel's suggestion is not to give up the search but to pursue it by safer means. This is an interpretation, not a clinical finding.

- **Meditation:** start with basic breath practice. Deep absorption can take years. [Emerging]
- **Breathwork, float tanks:** these are Kernel suggestions with thin evidence. Fast breathing or sensory deprivation can provoke panic, dissociation or worse in people with a history of psychosis, seizures, heart conditions or persistent depersonalization. Ask your clinician first and start with meditation and grounding.
- **Flow through physical mastery** such as climbing, martial arts or endurance sport, with sensible safety.

- **Psychedelic-assisted therapy** only inside licensed clinical programs, never self- administered. Regulation and trial status change; check current information with a specialist.

Genetics and tests

Do not delay starting recovery for test results. Everything below is a **[Kernel hypothesis]** or **[Emerging]**, and your clinical history is a better guide than any genotype.

Gene	Idea	Practical use
CYP2B6	The main liver enzyme that breaks ketamine down. Poor-metabolizer variants may mean higher peaks, longer effects, longer fog and perhaps more bladder exposure [Emerging; thinner evidence than the Kernel implies]	If ketamine always hit harder or lasted longer than for others, your dose history may understate your exposure. Tell your urologist and doctor
CYP3A4	Secondary pathway; drug and Pharmacist check food interactions change levels	
COMT	The Kernel links “Sage” (slow COMT) to escape from rumination and “Warrior” (fast COMT) to euphoric social states [Kernel hypothesis; the literature is mixed]	Use it as a question to explore, not a label
MTHFR Gene	Methylation; may partly Idea explain depression that was unresponsive to other treatment **[Kernel hypothesis]**	Discuss with a clinician Practical use
DRD2, BDNF, SLC6A4	Reward, plasticity and anxiety sensitivity **[Kernel hypothesis]**	Build several reward sources; exercise; treat anxiety

If testing: the source specifies whole-genome sequencing with a standard variant file (VCF). Methylation assays are a different test and do not call these variants, so check what you are ordering. A clinical pharmacogenomic panel gives clinical-grade calls.

Milestones

These are Kernel projections, not trial results.

When	Focus	What may change
Day 0 to 14	Safety, urology, no mixing, not alone in days 1 to 5	Rebound eases; emotions return
Months 0 to 3	Grounding, mood treatment, craving interrupt, sleep	Fog lifting; realness returning
Months 3 to 12	Trauma work, exercise, rebuilding routines, identity	Cognition and mood largely recover; early bladder damage may begin to heal if you stay stopped
Years 1 to 2	Deeper practice, work, family Cues fade; overwhelm and	grief become the main triggers
Years 3, 5, 10	Maintenance and stewardship	Urology on a schedule your urologist sets; no mixing, ever; helping others in the same territory

The Kernel does not promise zero risk, nor that bladder damage reverses. End-stage damage is irreversible. Its 12-month “projections” come from one case (a 33-year-old with PTSD who used weekly): for example 62% cessation or medical redirection with the Kernel’s plan versus 25% with standard care. These are Kernel projections for an idealized, fully adherent case, not trial results, and do not describe heavy daily use or established bladder disease.

FOR CLINICIANS

- Screen for lower urinary tract symptoms, haematuria, hydronephrosis and cholestatic pattern liver tests. Early referral to urology; the sources suggest follow-up every three months in year one.
- Withdrawal is mainly psychological; assess suicidality and psychosis. Avoid benzodiazepines unless indicated.
- Ask about co-use (opioids, benzodiazepines, alcohol, GHB) and adulterated supply, including xylazine, medetomidine and nitazenes.
- Evidence for supplements, peptides and the genetic claims is limited; the CYP2B6 claim is plausible but not well validated clinically.
- Treat the target condition (depression, PTSD, pain). Coordinate with any ketamine clinic. Concerning supervised ketamine after use disorder, the sources do not resolve it: specialist decision.
- Caution with breathwork and flotation in psychosis, seizure or cardiac history.

For families and supporters

- Take bladder symptoms seriously and help them get to a urologist.
- Never leave someone alone in a k-hole. Recovery position, 911 if breathing is irregular or they cannot be woken.
- Days 1 to 5 are the highest-risk window. Be present, calm and non-judgmental.
- Ask about suicidal thoughts directly. Call or text 988.
- A lapse is information and a medical risk. Respond with care, not punishment.
- Look after yourself too; SAMHSA’s line (1-800-662-4357) helps families.

KEY POINTS

- The bladder is the emergency: urology first, and stopping is the only way to halt damage.
- No antidote. Never mix with opioids, benzodiazepines, alcohol or GHB, and never use alone.
- Withdrawal is mostly psychological. Days 1 to 5 carry the highest relapse risk; do not be alone.
- The craving is for the exit. Ground, contact, then act on the need in other ways.
- Treat the depression, trauma or pain ketamine was covering, with clinicians.
- Grounding comes before any pursuit of expanded states. Medical ketamine is a different context and a specialist decision after problem use.

DXM (dextromethorphan)

In this chapter. DXM is the cough-suppressant ingredient in many over-the-counter (OTC) products, also called “robo,” “robotripping,” “Triple C,” “Skittles” or “DM.” It is cheap, legal, sold everywhere, and often dismissed as “just cough syrup.” This chapter covers what else is in the bottle, the medication interactions that kill, how DXM recovery differs from other substances, and how to treat what it was treating. It is US-centred. Shared rules are in the Handbook chapter “The 12 Safety Rules.”

Emergency box - **Possible large acetaminophen (Tylenol/APAP) exposure** from a combination product (NyQuil, DayQuil, many cold syrups): call **Poison Control 1-800- 222-1222** or go to an emergency department **now, before any symptoms.** Liver damage is silent for 24 to 72 hours and can become irreversible. Take the label with you. NAC (N-acetylcysteine) is a hospital treatment given by clinicians; taking a supplement at home is not a substitute for that call. - **Call 911** for: agitation, confusion, racing heart, high blood pressure, twitching or stiff muscles, or high temperature (possible **serotonin syndrome**, especially with an antidepressant); extreme confusion you cannot talk the person out of; very hot skin with no sweating; very slow or stopped breathing; a seizure; chest pain or a severe headache after a decongestant-containing product. Tell responders: “DXM, dextromethorphan,” and what else was in the product. - **Mood crash or suicidal thoughts after stopping:** call or text **988**. Crisis Text Line: text HOME to 741741. Teen Line: 1-800-852-8336. SAMHSA: 1-800-662-4357.

What DXM does and why it hooks people

DXM is pharmacologically unusual. It acts on several systems at once, and which one dominates depends on dose, product, other medicines, and your genes.

System	What happens	Why it matters in recovery
NMDA (glutamate) receptors In most people, the liver	enzyme CYP2D6 converts DXM into dextrorphan, an NMDA blocker much like ketamine. This produces dissociation.	After stopping, the system rebounds: anxiety, mental overdrive, sensory sensitivity. Ketamine-style recovery applies.
Sigma-1 receptors	DXM itself (not dextrorphan) acts here, affecting mood and stopping may partly reflect cognition.	The mood crash after losing this lift. **[Emerging]**

System	What happens	Why it matters in recovery
Serotonin transporter	Both DXM and dextrorphan block serotonin reuptake.	Adds to serotonergic medicines and drives serotonin syndrome risk. Serotonin recovery resembles MDMA recovery, but milder.
Opioid receptors	Weak action, mostly irrelevant at normal amounts.	At very high amounts it may add to breathing depression. Naloxone may partly help but is not a fix. Call 911.

Why it hooks. DXM often does a job. The Kernel's diagnostic question is: *what was it giving you?*

What DXM gave	What it may have been treating
Escape from the noise of ordinary thinking	Depression, anxiety, trauma, ADHD
Warmth, mood lift, social ease	Depression, social anxiety, loneliness
Paradoxical focus at lower amounts	Undiagnosed ADHD (often missed)
Exploring unusual states	Curiosity and meaning-seeking, especially in adolescents
Cheap, hidden intoxication	Scarcity, drug-tested schools, coercive settings; this needs structural help, not a supplement

This is the signal-not-sin idea: the preference points at something that needs repair. DXM is heavily an adolescent and young-adult problem, and often hidden because nobody takes an $8 bottle seriously.

The online DXM community produced real safety knowledge, including the interaction risk, long before many clinicians acknowledged it. Treat it as a source of harm-reduction information, not a recovery plan.

Danger points

1. What else is in the bottle

The most dangerous thing about DXM is often not DXM.

Co-ingredient	Found in	Danger	Response
Acetaminophen	NyQuil, DayQuil, many combination syrups	Liver failure; silent at first	Poison Control or ED **before symptoms**. Liver blood tests (AST, ALT, bilirubin, GGT).

Co-ingredient	Found in	Danger	Response
Chlorpheniramine (antihistamine)	Coricidin Cough & Cold ("Triple C")	Confusion, hallucinations, fast heart rate, overheating, seizures, arrhythmia. The Kernel treats this as the main killer in Triple C misuse.	911. Needs hospital care. Not manageable at home.
Guaifenesin Co-ingredient	Robitussin DM, many syrups Found in	Severe vomiting; aspiration risk if sedated Danger	Recovery position; seek care if it persists. Response
Pseudoephedrine / phenylephrine	"PE" and decongestant combinations	High blood pressure, dangerous heart rhythms; amplified with DXM	Chest pain, very fast heartbeat or severe headache: 911. ECG and blood pressure check afterwards.
None (DXM-only products such as Delsym or plain gel caps)	Single-ingredient products	DXM's own risks only Harm-reduction fact,	not endorsement.

[Established] Acetaminophen liver toxicity, chlorpheniramine toxicity and decongestant heart effects are well documented.

2. Serotonin syndrome and medication interactions

DXM blocks the serotonin transporter, the same target as SSRIs. Combined with other serotonergic medicines it can cause fatal serotonin syndrome. This is the most common serious medical complication of DXM misuse and it is preventable. **[Established]**

Do not combine DXM with:

- SSRIs (fluoxetine, sertraline, escitalopram, citalopram, paroxetine) and SNRIs (venlafaxine, duloxetine)
- MAOIs, including high-dose St. John's wort; ayahuasca or harmaline-containing preparations also act this way. This combination has killed people.
- Tramadol
- Linezolid (an antibiotic with MAOI properties)

Signs: agitation, confusion, rapid heart rate, high blood pressure, dilated pupils, muscle twitching or rigidity (especially legs), diarrhea, sweating, high temperature. **Call 911.**

CYP2D6 makes it worse. Fluoxetine and paroxetine are both SSRIs *and* strong CYP2D6 blockers. They push DXM levels up and turn a normal metabolizer into an effective poor one. The Kernel calls DXM with Prozac or Paxil one of the highest-risk combinations in OTC use. Bupropion also blocks CYP2D6.

Over-the-counter does not mean safe for everyone. If you take any serotonergic medicine, check every cold and cough product for dextromethorphan, and ask a pharmacist.

3. Prescription products that contain dextromethorphan

This section is not in the original Kernel text; it was added to close a gap flagged in review.

- **Dextromethorphan + bupropion** is an antidepressant approved in the US in 2022. Bupropion is included on purpose: it blocks CYP2D6, which keeps dextromethorphan levels higher and longer.
- **Dextromethorphan + quinidine** is a prescription product. Quinidine is also a CYP2D6 blocker, used for the same reason.

Why this matters here: these products show that CYP2D6 blockade changes what DXM does, which is the same mechanism behind the interactions above and the genetics discussion below. This chapter is about use outside a prescription. **Never stop or change a prescribed medicine on your own.** Tell your prescriber about any non-prescribed DXM, because it changes the interaction risks. If you take either product, treat OTC cough and cold products containing DXM as an added dose and ask your prescriber or pharmacist first.

4. High-dose emergencies

At very high amounts the picture can include delirium (the person cannot be reasoned with or grounded), overheating, breathing depression and seizure. The Kernel names overheating as the most likely cause of death at very high amounts, but that rests on limited evidence. **[Emerging]** Falls and injury are also a real hazard because coordination is badly impaired.

If you are with someone in this state:

1. Call 911 and say “DXM, dextromethorphan.”
2. Move them away from traffic, heights and water. Keep the room calm and your voice low. Do not restrain unless needed to prevent immediate harm.
3. If they are hot, cool them (cool room, remove excess clothing).
4. If breathing is very slow or stopped and you are trained, give rescue breathing; use the recovery position otherwise. Naloxone may partly help but does not replace 911.
5. For a seizure: recovery position, do not restrain, note the time, tell EMS.

5. Tolerance and relapse

A break is not a reset. DXM has no seizure-type withdrawal and no opioid-style illness, so people underestimate it, then chase “the next plateau” while their judgment is the very thing the drug impairs. Every added dose of a combination product also adds acetaminophen. A lapse is information and a medical risk: check the product, check your medications, and call 911 for emergency signs.

Getting safe: the medical picture

There is no medication-assisted treatment for DXM and no DXM-specific clinical guidelines. You may have to advocate for yourself.

Medical priorities (principles only; a clinician decides what is needed):

Priority	When	Why
Identify the exact product	Day 0	The co-ingredient may be the real danger.
Review all medications Priority	Day 0 When	Serotonergic and CYP2D6- Why blocking drugs.
Poison Control / ED if possible large acetaminophen exposure	Immediately	Do not wait for symptoms.
Liver tests if acetaminophen was involved	First week, repeat at about 3 months	The one time-urgent follow-up.
ECG and blood pressure if a decongestant was involved	Early	Heart-rhythm risk.
Depression, anxiety and ADHD screening	Weeks 1 to 12	The usual drivers.
CYP2D6 testing	When practical	See genetics below.

NAC and supplements. NAC is given in hospital for acetaminophen overdose, where the dose and route depend on how much was taken and when. Oral supplements are not treatment for a possible overdose. The Kernel's own text suggested taking oral NAC promptly; this chapter replaces that with the Poison Control-first rule. **[Established]** Nothing at home replaces that call. Supplements discussed later are optional support at most, and an interaction check with a pharmacist comes first.

Having the physician conversation. "I've been drinking a lot of cough syrup" tends to get brushed off. Naming it clinically changes the visit. Bring:

- The substance (dextromethorphan) and the exact products, how often and how much
- Current symptoms (rebound anxiety, mood crash, fog, visual disturbances)
- A request for liver tests, and a CYP2D6 test
- Your suspicion that depression, ADHD, anxiety or trauma was driving the use
- Every medication and supplement you take

Adolescents and parents: ask for an adolescent-informed clinician or counsellor, school support, and family involvement where it is safe.

Psychosis. Loss of reality testing, hearing voices or persecutory beliefs need urgent psychiatric evaluation.

The first weeks

Time	What to expect	What helps
Hours 0 to 24	NMDA rebound: anxiety, mental overdrive, sensory sensitivity, possible visual disturbances, mood crash, poor sleep	Low stimulation, rest, slow breathing, no stimulants
Days 1 to 7 Time	Often significant depression What to expect as the artificial lift clears (the main relapse driver here), fog, irritability, poor sleep	Do not go through it alone. What helps Exercise, daylight, people. Tell a clinician if mood is low.
Weeks 2 to 8	Gradual, uneven improvement. The original problem (depression, ADHD, anxiety) reasserts without the chemical buffer.	Start treating the underlying condition now.
Months 1 to 6	Substantial recovery expected in the Kernel's timeline	The states DXM provided start to become reachable by other routes.

Labels: this timeline is a **[Kernel hypothesis]** drawn from ketamine and psychedelic recovery. There is no controlled DXM study behind it.

Craving. DXM has the shortest path from craving to use of any substance in the series: about ten minutes and a few dollars at any pharmacy or store. Recovery therefore has to be largely internal.

Trigger	What helps
Passing a pharmacy or cough-and-cold aisle	Choose routes that avoid pharmacies early on. Do not enter that aisle. Bring a trusted person on pharmacy errands. Some chains will flag an account; purchase limits and tracking vary by state and chain, so check locally.
Depression dip (the most reliable trigger)	Make the mood plan real: clinical care, exercise, light, social contact
Being alone with nothing to do	Structure the day; treat ADHD if present
Anxiety spike, especially social	Slow breathing; social-anxiety treatment
Online DXM communities and trip reports	Block them for now

The 10-minute interrupt. When a craving fires:

1. Stop walking toward the supply. Do not decide for 10 minutes.
2. Do five rounds of slow paced breathing (4-7-8).
3. Name the state under the craving: depression, anxiety, boredom, ADHD.
4. Change your route or place.
5. Contact someone.
6. Do something that gives an adjacent state: quiet rest, meditation, hard exercise, absorbing music. Avoid music tied to using; the auditory memory can trigger craving.

Persistent visual disturbances. Heavy use at high amounts can leave HPPD-like visual phenomena, as with ketamine and psychedelics. The Kernel's advice: stop DXM completely, avoid cannabis (its most reliably reported aggravator), protect sleep, manage anxiety, and get a neurological and psychiatric evaluation if the symptoms are persistent and impairing at four or more weeks. The claim that DXM-related HPPD is milder and mostly resolves over weeks to months rests on limited evidence. **[Emerging]**

SSRIs and HPPD: a specialist decision. The Kernel's documents disagree. The LSD material says avoid SSRIs for HPPD. The DXM material says an SSRI is appropriate once DXM has fully stopped, while also advising against SSRI monotherapy for visual phenomena. This conflict is unresolved. Whether to use an SSRI for depression, anxiety or visual symptoms after DXM is a **psychiatrist's decision**, based on your history. If you have already been prescribed one, do not stop it on your own, and never take DXM on top of it.

Hyperventilation-style breathwork can provoke panic or dissociation in people with a history of psychosis or seizures, heart conditions or persistent perceptual disturbance. Ask your clinician first. Start with slow breathing, quiet rest and meditation.

Rebuilding

Treat what it was treating

DXM was a solution, so recovery means finding the actual problem. Without this track, recovery is "holding a gap without filling it."

Underlying condition	Principles
Depression	Often the main driver, especially in teens and young adults. See a psychiatrist if it stays clinical after the first weeks. An SSRI can be appropriate only after DXM has stopped completely (see the specialist-decision note above).

Underlying condition	Principles
ADHD	Under-recognized in people with problematic DXM use. Ask for an evaluation early. Where stimulant misuse is a concern, non-stimulant options exist. A prescriber decides. The Kernel calls ADHD treatment the simplest and most commonly missed step.
Social anxiety	Responds to CBT with graded exposure and, with a prescriber, medication after DXM has stopped.
Trauma	Needs trauma-specific therapy (for example EMDR or CPT).

Building natural access to what DXM gave

Match the replacement to the function. These are practices, not promises.

DXM gave	Build
Quiet from the noise of thought	Meditation, non-sleep deep rest, in daily sessions built up gradually
Warmth and mood lift	Vigorous exercise, scheduled time with safe people, laughter, music
Social ease	CBT-based program, graded exposure, community
Exploring unusual states	One contemplative tradition practiced steadily, with a teacher and community
Focus	ADHD treatment, daily exercise, a structured routine
Teens and young adults	

- Recovery is partly a *first* construction of identity, not a return to an earlier self.
- Family is part of the environment. Family members who understand it is not “just cough syrup” help. Family therapy is often appropriate.
- Fog and unmanaged ADHD hit school hard. Accommodations and counsellor support are recovery tools.
- The peer group needs renegotiating. Finding peers through sport, arts or teams is the main social step.
- Some young people used DXM to cope with questions about sexuality, identity, family stress and meaning, without adult frameworks. Recovery includes building those through therapy and community.

Supplements and peptides: optional, with a pharmacist

The Kernel proposes a supplement stack built on a methylation base (folate, B12, B6, magnesium), NMDA-balance support (NAC, magnesium, L-theanine, glycine, omega-3), serotonin support, liver support and sleep support. Evidence for these in DXM recovery is thin. **[Emerging]** Dose with your clinician or pharmacist, and run each addition through an interaction checker.

- **5-HTP and tryptophan:** only on a physician's advice, and never with an SSRI, SNRI, MAOI or other serotonergic drug. The Kernel waits at least 3 to 5 days after last DXM use because of residual serotonin-transporter blockade; other Kernel documents give shorter or longer windows, so use the conservative one and let a physician confirm timing.
- **Liver support after acetaminophen exposure** (such as milk thistle or alpha-lipoic acid) is for after medical assessment, under a clinician. It does not replace it.
- **Dopamine-raising supplements** (such as tyrosine) are not advised if psychotic symptoms are active. Wait for psychiatric clearance.
- **Peptides** (BPC-157, Selank, Semax) are research compounds. **[Kernel hypothesis]** Physician-only; not a self-start step.

Genetics and tests

The Kernel calls DXM the most genetically variable substance in the series. All of this is [Kernel hypothesis] or **[Emerging]**, except CYP2D6's effect on DXM metabolism, which is well established clinically.

Result	What it may mean
CYP2D6 normal metabolizer	DXM converts efficiently to dextrorphan, so effects are mostly dissociative. **[Established]**
CYP2D6 poor metabolizer	DXM itself accumulates: more serotonin and sigma-1 effect, less dissociation, much higher serotonin syndrome risk. Never combine with any serotonergic medicine. **[Established]**
CYP2D6 ultrarapid	Faster, more intense dissociation. Bupropion, fluoxetine or paroxetine can make an ultrarapid or normal metabolizer behave like a poor one.
SLC6A4 short/short	Possibly stronger serotonin effects and risk. **[Kernel hypothesis]**
HTR2A high-expression	Possibly stronger psychedelic-like effects and HPPD risk. **[Kernel hypothesis]**
COMT Met/Met	Possibly more anxiety-escape use. **[Kernel hypothesis]**

Result	What it may mean
MTHFR variants	May contribute to depression; do not assume it replaces treatment. **[Kernel hypothesis]**
DRD4 / DAT1 ADHD-linked variants	Cannot diagnose ADHD; evaluate clinically. **[Kernel hypothesis]**

Until results arrive, these questions are only hints: Did DXM hit much harder than for peers at the same amount? Was it mostly warmth rather than dissociation? Did you ever have a serotonin-syndrome-like reaction? Did small amounts help you focus? Did you develop visual disturbances? A "yes" to any is something to raise with a clinician, not a diagnosis.

Never delay starting recovery for test results. Keep your CYP2D6 result on a card; it affects many future prescriptions. If ordering whole-genome sequencing, ask for a standard variant file; "WGBS" usually means bisulfite sequencing, a methylation test not built to call variants.

Milestones

Kernel projections, not trial results. The Kernel's DXM timeline ends at about six months, and it gives no DXM case study or percentages. Everything beyond that is extrapolation.

When	Focus	What the Kernel projects
0 to 3 months	Safety, liver check, medication review; riding out the crash; first treatment of underlying condition; craving plan	Crash passes in the first weeks. Substantial NMDA and serotonin recovery by months 1 to 6. Repeat liver tests at about month 3 if acetaminophen was involved.
3 to 12 months	Underlying-condition treatment holds; natural-access practices build	Visual disturbances resolved for most. Relapse risk highest at low-barrier moments such as a pharmacy visit or a depression dip.
Year 1 to 2	Identity, school or work, community; review of medications	Treatment, not DXM, carries the load.
Year 3	Medication review with SSRI caution; step supports down to upkeep, not zero; chosen practice steady	Extrapolation.
Year 5	Low mood and being alone remain the likeliest triggers; peer and family support work	Extrapolation.

When	Focus	What the Kernel projects
Year 10	Standing safeguards: never DXM with serotonergic medication, check every cold product, CYP2D6 card	Extrapolation.

What changes the outcome: not knowing the product; mixing with serotonergic drugs; ignoring CYP2D6; leaving the pharmacy route unchanged; going through the first weeks alone; no treatment for depression or ADHD; cannabis while visual symptoms persist; being dismissed and giving up.

FOR CLINICIANS

- Ask which product, how much, how often, and every medication. Co-ingredients (acetaminophen, chlorpheniramine, decongestants) and serotonergic or CYP2D6- inhibiting drugs drive the risk.
- Possible significant acetaminophen exposure: poison-center consultation and standard hospital management, not oral NAC advice. Recheck liver tests as indicated.
- Consider CYP2D6 status and inhibitors (fluoxetine, paroxetine, bupropion), and prescription dextromethorphan combinations (with bupropion or quinidine).
- Screen for depression, anxiety, ADHD, trauma and psychosis. There are no DXM-specific guidelines and no approved medication for DXM use disorder.
- Post-DXM SSRI use and HPPD-type SSRI advice conflict across Kernel documents; evidence is limited. Individualize.
- Genetic and supplement claims here are hypotheses.

For families and supporters

- It is not “just cough syrup.” Treat it seriously and without shame.
- Learn the emergency signs and the number: Poison Control 1-800-222-1222; 911 for emergencies.
- Check what is in the home and which medicines the person takes. Antidepressants plus DXM are a real danger.
- Support pharmacy-free routes, daily structure and treatment for depression, ADHD or anxiety.
- Treat a lapse as information and a medical risk, not a betrayal.
- Do not insist on stopping a prescribed medicine; ask the prescriber.

KEY POINTS

- If acetaminophen exposure is possible, call Poison Control (1-800-222-1222) or go to the ED before symptoms. NAC is an adjunct, not home treatment.
- Read the label: the co-ingredient, especially in Triple C, may be the real killer.
- DXM with SSRIs, SNRIs, MAOIs, tramadol or linezolid can cause fatal serotonin syndrome; CYP2D6 blockers make it worse.
- Prescription dextromethorphan products (with bupropion or quinidine) depend on CYP2D6 blockade; never change them on your own.
- Because supply is everywhere, recovery is mostly internal: a craving plan and treatment for what DXM was treating.
- Whether to use an SSRI after DXM, or with visual symptoms, is a specialist decision.

PCP

In this chapter PCP (phencyclidine; “wet,” “sherm,” “angel dust”) is a dissociative that also acts like a stimulant and an anticholinergic. That mix makes intoxication dangerous and psychosis long. This chapter covers the emergency picture, why psychiatric care comes first, what recovery usually involves, and how to rebuild. US-centred: phone numbers and services are for the United States.

Emergency box. Call 911 first. PCP intoxication is a medical emergency. Warning signs, together: eyes that cannot hold still (nystagmus, the most reliable sign), little or no response to pain, extreme agitation with apparent strength, and confusion, hallucination or paranoid terror. - Tell the dispatcher: “PCP, phencyclidine, with agitation and apparent psychosis.” - Do not restrain the person forcefully and do not try to talk them down. Struggle against restraint can cause overheating and cardiac arrest, and has caused deaths. - Lower noise and light. Speak slowly and quietly, from a distance. Do not touch. - Move them away from traffic, water, heights, hot surfaces. Without pain signals they can be badly hurt without noticing. - Very hot skin with no sweating needs cooling and 911. - Sedation is for paramedics and clinicians to decide. - Psychosis, confusion or agitation that has not substantially cleared within 48 hours of last use: psychiatric evaluation, an emergency department if needed. Say it is PCP. - Crisis: call or text 988. Poison Control 1-800-222-1222. SAMHSA 1-800-662-4357. Crisis Text Line: text HOME to 741741.

What PCP does and why it hooks people

PCP acts on four systems at once. Most other dissociatives act mainly on one.

System	Effect	Why it matters
NMDA (glutamate) blockade	Dissociation, pain insensitivity, memory and thinking impairment	Like ketamine, but stronger, and it leaves the receptor much more slowly. **[Established]**
Dopamine reuptake inhibition	Stimulant arousal, agitation, reward and “wanting”	Ketamine lacks this. It adds conventional addiction pull. **[Established]**
Sigma-1 activation	Distinct perceptual and mood Shared with DXM. changes	

System	Effect	Why it matters
Muscarinic (anticholinergic) blockade	Dry mouth, fast heart, poor sweating, confusion, memory and attention effects	Raises overheating risk and affects memory in recovery. [Established]

Dissociation plus stimulation, with no pain warning, explains the behaviour the public sees. Kernel framing: the person who used it was not the person others saw.

What it was giving you (signal-not-sin). Often two or three things at once: - Escape: quiet, disconnection, relief from an unbearable ordinary state. - Intensity: arousal that baseline life did not provide. - Pain relief, physical or emotional. Trauma is common here. - Sometimes availability: cheap, local, embedded in social networks.

These needs were real. Recovery builds other routes to them. [Kernel hypothesis]

Danger points

Psychosis. PCP psychosis can last days to weeks after the last use. It is a medical condition, not "still being high." It can look like brief psychosis, schizophreniform disorder or schizophrenia while it lasts. [Established] Each untreated day carries risk from agitated, self-endangering behaviour. See "Getting safe."

Overheating. Stimulant demand, agitation and poor sweating can combine. This is a main cause of death. [Established]

Injury without pain. Burns, cuts and fractures can go unnoticed.

An unpredictable supply. "Wet" is usually a tobacco or cannabis cigarette dipped in a liquid. The liquid may be PCP in a solvent, sometimes including real embalming fluid, which adds lung and body toxicity. Strength varies enormously. What is sold as PCP may contain ketamine, PCP analogs, other drugs, or no PCP.
Nothing is verified safe by a field test. No reagent kit can tell you what is in a wet cigarette, how much, or that it is safe, so do not take reassurance from a colour change. Current adulterant warnings for the wider drug supply are in the shared unknown-supply guidance. See the Handbook chapter "The 12 Safety Rules."

Slow clearance and fat storage. - PCP dissolves in fat. Plasma half-life is long and highly variable. [Established] - Effects can return days to weeks after stopping, especially with exercise, fasting or illness, as stored drug is released. [Emerging] Plausible and consistent with the drug's chemistry, but less studied than the other points here. - Urine tests may stay positive about a week in occasional users and a month or more in heavy users. Screens can also be negative by the time someone reaches a psychiatrist.

Metabolism and drug interactions. The enzyme CYP2B6 (the Kernel's "Dissociative Logjam" gene) helps clear PCP. Poor metabolizers may have longer, deeper effects and longer psychosis. [Kernel hypothesis] Plausible; thinner evidence for PCP than for ketamine. CYP3A4 also contributes, so medicines that slow it

(some antifungals, some antibiotics, some HIV drugs, grapefruit) may slow clearance. Tell every prescriber and pharmacist that you used PCP. CYP2B6 status also matters for some medicines, including bupropion and efavirenz. Interaction-check every medicine and supplement with a pharmacist.

Tolerance after a break. A break is not a reset. Tolerance falls, but with PCP there is also no reliable inner sense of "enough," because its effects impair self-assessment. There is no dose to safely chase. Using alone adds risk.

Mixing. Alcohol, benzodiazepines and other sedatives with dissociatives raise risk. Never stop alcohol, benzodiazepines, Z-drugs, GHB or high-dose gabapentinoids suddenly. That is medically supervised only.

Getting safe: the medical picture

Psychiatric care comes first. Unlike other dissociatives, PCP recovery has a medical dimension from day one.

- **In the first hours:** a low-stimulation room and sleep are the most powerful non-drug tools. Emergency teams usually use sedatives rather than physical restraint, and choose medicines with seizure risk in mind. This is clinicians' work.
- **Beyond about 48 hours of psychosis:** see a psychiatrist. An antipsychotic may be chosen by them. Dosing and schedules are theirs to set.
- **Say the words:** "This is PCP-induced psychosis, not primary psychosis." Treatment and prognosis differ.
- **Expect:** most PCP psychosis clears substantially within about 2 to 6 weeks of abstinence with treatment and sleep. Poor metabolizers may take longer. [Kernel projection]
- **If psychosis persists beyond about 6 weeks of full abstinence,** a specialist evaluation for an independent psychotic disorder is warranted.
- **Do not label it schizophrenia too early.** A first psychotic episode in a young person who used PCP should always consider PCP as the cause.
- **Do not treat negative symptoms as plain depression.** Blunting, low motivation and poor thinking can persist after hallucinations fade. They may reflect dopamine and prefrontal changes rather than a mood disorder, so an antidepressant alone may not help. **[Emerging]** Telling the two apart is a specialist decision. Some people need continued antipsychotic support.

No dopamine-raising supplements while psychotic. Do not use tyrosine, mucuna or L-DOPA, rhodiola or other stimulating or dopamine-raising supplements while you are psychotic or have any psychotic symptoms (including lingering paranoia, hallucinations, disorganised thinking). They could worsen psychosis. Wait for your psychiatrist to say it has cleared, then ask again before adding anything.

Medications. There is no FDA-approved medication for PCP use disorder. - Antipsychotics treat prolonged psychosis. This is symptom treatment, not addiction medicine. - Benzodiazepines are for short-term acute

use only. Addiction risk is high, and stopping them is medically supervised. - If ADHD is confirmed, non-stimulant options exist; stimulant medicines in this setting are a specialist decision. - Depression treatment: see above. Tell the prescriber about every supplement. Serotonergic and other interactions matter.

Nicotine. Wet is often smoked on tobacco. Stopping smoking can change levels of some psychiatric medicines (including clozapine and olanzapine), so coordinate with your prescriber before a quit date. Bupropion is one cessation option, but CYP2B6 status changes how it is handled.

How to be taken seriously. PCP is poorly known, even to many addiction specialists. Be plain: - “I have a history of PCP use. It has NMDA, dopamine, sigma-1 and anticholinergic effects.” - Describe how long psychosis lasted and what symptoms you have now. - Say you think you may have been a slow metabolizer, and ask about CYP2B6 and CYP3A4 testing. - Ask for a cognitive evaluation, and for help with sleep.

The first weeks

- **Sleep.** Insomnia has several drivers: glutamate rebound, a dopamine crash, anticholinergic rebound and, if present, psychosis. Protect sleep above everything. If a sleep medicine is needed, a psychiatrist chooses it. Slow, warm audio and no music tied to use.
- **Both loud and dull.** Early recovery is often too loud (anxiety, cognitive overdrive) and too dull (low reward) at once.
- **Waves.** Craving, fog and low mood come in waves. Negative symptoms and memory trouble improve slowly.
- **Flare-ups.** Symptoms can briefly return as stored drug is released. Report new perceptual symptoms early. Do not use more to “smooth it out.” More PCP prolongs it.
- **Foundation supplements.** Some people add support for methylation, glutamate balance, sleep and memory (for example magnesium, folate-type and B vitamins, NAC, theanine, omega-3, choline sources). **[Emerging]** Evidence for PCP specifically is limited. Dose with your clinician or pharmacist. Do not stack choline-type products and huperzine without a physician. Peptides are research compounds: physician only, not a self-start step. **[Emerging]**
- **Re-check the dopamine rule** before any new supplement.

The craving

The craving is usually two at once: dissociative escape (quiet, disconnection, pain relief) and stimulant intensity (arousal, power, loudness). A sequenced response works best:

1.**Name which craving is firing.** Escape, intensity or both. 2.**Move hard first.** Sprints, push-ups, cold water. The intensity side needs a real signal. 3.**Then slow breathing.** Six cycles of 4-7-8 for rebound anxiety. Avoid forced- hyperventilation methods, which can provoke panic or psychosis-like states. 4.**Use the supports**

your clinician has agreed (for example magnesium or NAC). Nothing dopamine-raising unless cleared. 5.**Contact someone outside the old group.** Person, place and substance form a conditioned unit. 6.**Pain-driven craving:** use the pain plan (see below). The pain was real. 7.**Residue-driven craving:** perceptual oddities can push people back toward the drug that caused them. Tell yourself: "This is PCP residue being metabolized. More PCP will extend it. Sleep and time are the resolution." Take prescribed medicine as directed and call your psychiatrist.

Cues. The chemical smell of the cigarette is one of the most strongly conditioned cues. Remove papers, tobacco and materials tied to wet preparation. Plan around places where it was obtained or smoked.

When a plan feels wrong. A doubt such as "the plan must be wrong" can be triggered by peers' lapses, confident advice from untrained people, or a prescriber who treats prescribed drugs casually. Treat the doubt as information, tell your clinician or sponsor, and do not abandon the plan alone. See the companion piece on the Commandeering pattern.

Rebuilding: natural architecture

Build two architectures, plus a memory track. Start with intensity (quicker reward), then the contemplative one (slower, more durable). **[Kernel hypothesis]**

Intensity track - Hard training with real stakes. - Competition in any domain, mastery at the edge of skill. - Service. Peer recovery work and community service can be especially meaningful for people from communities that treatment systems failed.

Escape track - Meditation and non-sleep deep rest (yoga nidra). - Nature and awe. - If pain relief was the main pull: physical therapy, exercise, and a proper non-opioid pain plan from a clinician. - Breathwork only with clinician clearance, because of psychosis risk. Slow breathing is safer.

Memory and attention track. PCP's anticholinergic and NMDA effects can leave memory, attention and planning impaired. This may need the longest explicit rebuilding of any substance in the series. - Deliberate recall: journaling, telling stories. - Sustained attention: long reading, chess. - Learning a complex motor skill: martial arts, dance, an instrument. - Choline-rich foods (eggs, fish, legumes).

Treat what it was treating. - PTSD and trauma: run trauma treatment alongside. - ADHD: evaluate; non-stimulant options if confirmed. - Chronic pain: plan it. - Cannabis or tobacco as the base: address them (see their chapters). - Related chapters: Ketamine, DXM, Cocaine, Crack.

Structure and community. Housing, work and legal help matter. Treatment specifically for PCP is rare; the epidemic periods of the 1970s and 1980s hit urban, lower-income, predominantly Black communities in cities like Los Angeles, Washington DC, Philadelphia and Detroit, and the response favoured enforcement over medicine. The Kernel's position: someone who developed this use under those conditions was failed by systems, not by their constitution. Rebuild a community away from the old person-place-substance unit.

Genetics and tests

[Kernel hypothesis] Genetics here is a map for questions, not a verdict. **Never delay starting for test results.** Clinical history is the better guide.

Marker	Why people look at it
CYP2B6 (poor metabolizer variants)	Possible slow clearance and longer psychosis; relevant to bupropion and efavirenz. Most actionable test, and one few physicians think to order. [Emerging]
CYP3A4 and interacting drugs	Slower clearance with some inhibitors.
COMT (Val/Val, Met/Met) Marker	Intensity-seeking vs. higher psychosis vulnerability. Evidence is mixed. Use history, not the genotype. [Kernel hypothesis] Why people look at it
DRD2 A1	Possible reward deficiency, so build several reward sources.
MTHFR, BDNF	Possible methylation and recovery-pace effects. Weak evidence.

Without testing, ask yourself: - Were the effects consistently stronger or longer than a friend's at the same amount? (possible slow clearance) - Did confusion or psychosis last for days? (slow clearance, fat storage, or both) - Was the pull mostly stimulant intensity, or mostly escape and pain relief? - Did PCP feel "calm" or "right"? (This may signal the highest psychosis risk, not safety.)

Order a standard variant (VCF) or clinical pharmacogenomic panel. A methylation-sequencing assay is not designed to call these variants. Write your results on a card for prescribers.

Milestones

No PCP case study exists in the Kernel, and it gives no 12-month percentages. The timelines below are Kernel projections, not trial results.

When	Focus	Expected
Hours to about 8	Safety	Main effects last roughly 4 to 8 hours; psychotic features can last days to weeks. [Established]
Days 0 to 14	Emergency plan, psychiatric evaluation if psychosis persists, sleep, temperature and heart watched	Safe start

When	Focus	Expected
Weeks 2 to 6	Psychosis treated	Most psychosis clears substantially; longer in poor metabolizers
Beyond 6 weeks	Independent-disorder check	If psychosis persists, specialist evaluation
Months 1 to 12	Both architectures, memory track, trauma and ADHD care	Cognition improves; roughly 6 to 12 months for significant gains after heavy use
Year 1 to 2	Cues fade; pain and loss may become the triggers	Foundation work becomes maintenance
Year 3 When	Standing psychiatric relationship if psychosis was prolonged; medication review Focus	Memory and focus close to rebuilt Expected
Year 5	Peer work, service	Steward of a small set of safeguards
Year 10	Name PCP to every clinician	Check results against new medicines

Years 3 to 10 are extrapolation. The Kernel does not promise zero risk: psychosis can persist, symptoms can re-emerge from fat stores, and some heavy users keep a lasting deficit after psychosis resolves.

What worsens outcomes: treating psychosis as “still high”; restraining an intoxicated person; adding stimulating supplements during psychosis; missed diagnosis; building one architecture only; ignoring memory damage; leaving cues and the old group intact; using more to smooth out residue.

A lapse is information and a medical risk. Do not use alone. Get urgent help for agitation, confusion or psychosis.

FOR CLINICIANS

- Think PCP in first-episode psychosis with nystagmus, analgesia and agitation, even with a negative screen.
- Acute agitation: low stimulation, benzodiazepines in a monitored setting; temperature and rhabdomyolysis watch.
- Describe the picture (severe agitation, hyperthermia, risk of collapse) rather than using the contested label “excited delirium.”
- Differentiate PCP-induced from primary psychosis. Re-assess at about 6 weeks of abstinence.
- Negative symptoms may not respond to an antidepressant alone. **[Emerging]**

- Consider CYP2B6/CYP3A4 status before bupropion, efavirenz and other substrates. Check interactions with nicotine cessation.
- No dopamine-raising supplements during psychotic symptoms. Peptides and other research compounds are physician-only.

For families and supporters

- Call 911 for the signs in the Emergency box. Stay calm, quiet and at a distance. Do not restrain.
- Do not argue with delusions. Reduce light and noise.
- Psychosis that lasts past 48 hours needs a psychiatrist, not patience.
- Help with sleep, appointments and removing wet materials from the home.
- Do not give supplements during psychosis. Ask the clinician.
- Look after yourself. Family and Support Network guidance is in its own chapter.

KEY POINTS

- PCP intoxication with agitation, pain insensitivity and psychosis: call 911. No forceful restraint.
- Prolonged psychosis is a medical condition: psychiatric care first, and say it is PCP.
- No dopamine-raising supplements (tyrosine, mucuna/L-DOPA, etc.) with any psychotic symptoms.
- Nothing about “wet” is verified safe by a field test.
- Cravings come in two kinds: escape and intensity. Build two architectures and a memory track.
- Do not wait for gene results to start. Tell every clinician about PCP.

CANNABIS, NICOTINE AND INHALANTS

Cannabis

> **In this chapter.** Plant cannabis (flower, vapes, concentrates, edibles, hash). Cannabis withdrawal is real but rarely a medical emergency. What makes it hard is slow, flat misery and an anxiety that was often there first. Synthetic cannabinoids (K2, Spice) are a different and more dangerous substance. Resources are US-centred. Shared rules are in the Handbook chapter “The 12 Safety Rules”.

Emergency box - Hearing voices, paranoia, losing your grip on what is real, or a first psychotic episode, whether or not you used recently: get a psychiatric evaluation now. Call **911** in an emergency. - Thoughts of suicide or self-harm (withdrawal low mood can be heavy): call or text **988**. Crisis Text Line: text HOME to 741741. - Chest pain, seizure, or severe agitation after **K2/Spice or any unknown product**: **911**. Do not treat this as plant-cannabis withdrawal. - Possible overdose on an edible (extreme panic, vomiting, confusion, fast heartbeat): Poison Control **1-800-222-1222** or 911. - Support: SAMHSA **1-800-662-4357**.

What it does and why it hooks people

The body has its own cannabis-like system, the endocannabinoid system. It helps regulate anxiety, sleep, pain, appetite, stress and mood. Its main natural messenger is anandamide, released by exercise, play, creative absorption and calm.

When THC supplies that regulation from outside, the brain turns down its own production and reduces the number of CB1 receptors. **[Established]** (CB1 downregulation with heavy use.) The Kernel’s image is a system that “outsourced” its regulation. When THC stops, the internal system is under-powered for a while.

Cannabis use disorder is real. Cannabis withdrawal is recognised in the DSM-5. It was long dismissed as “just psychological”. That dismissal hurt people. **[Established]** **Signal, not sin.** Many people use cannabis because it fixes something: anxiety, a mind that will not quiet, insomnia, pain, trauma, undiagnosed ADHD. The Kernel calls this the Sage pattern, the person who runs hot and thinks too much. That pattern is a **[Kernel hypothesis]**. The practical point stands without it: **ask what the cannabis was treating, and treat that directly.** If you only remove the cannabis, the pull stays biological.

Form and strength matter

Form	What to know	Withdrawal tends to be
Flower	The classic baseline	Mild to moderate
Hash	Concentrated resin	Moderate
Vape cartridges	Often far more THC than people realise. If you vape, you probably use more than you think.	Moderate to severe
Concentrates (wax, dabs, shatter)	The most potent products	Severe. Take it as seriously as any significant withdrawal.
Edibles	Onset can take up to two hours, and the liver makes a stronger, longer-lasting metabolite. Regular high-dose use can delay withdrawal 24 to 48 hours.	Moderate
Synthetic cannabinoids (K2, Spice)	Not cannabis (see below)	Severe; medical care needed

Danger points

- **Psychosis.** Heavy, early-onset, high-potency use raises the risk of psychosis, and a family history raises it further. [Established] (population level.) If you have had paranoia, hallucinations or an episode, the Kernel's goal is complete abstinence, not moderation. See "Genetics" for why history beats genes.
- **Synthetic cannabinoids.** They bind CB1 receptors far more strongly than THC with no ceiling effect. Seizure, heart events and severe psychosis are documented. Withdrawal needs medical supervision. [Established]
- **Edible redosing.** "It isn't working" after 30 to 60 minutes is the classic mistake. Wait. Redosing inside the delay window is a common cause of accidental overdose. The same pattern, a felt doubt answered by abandoning the plan, can happen in recovery (see Chapter "The Commandeering Map").
- **Swapping to alcohol.** The Kernel calls cannabis-to-alcohol transfer the most common and most dangerous swap for this group. Watch it from week one.
- **A break is not a reset.** After days or weeks off, tolerance falls. Returning to the old amount or a high-potency product can hit much harder, and bring back anxiety or paranoia.
- **Nothing unverified is safe.** Unregulated vapes and edibles vary widely in strength and contents.

Getting safe: the medical picture

Most plant-cannabis withdrawal does not need supervision. It does not carry the seizure risk of alcohol or benzodiazepine withdrawal. Still:

1.**Screen for psychosis first**, with a clinician. If you have a history, get a psychiatric evaluation before starting any supplement plan. Do not take dopamine-raising supplements if you are, or have been recently, psychotic. 2.**Check what else you use.** Alcohol, stimulants and sedatives change the plan. If you also use alcohol, benzodiazepines, Z-drugs, GHB or high-dose gabapentinoids heavily, do not stop those suddenly. See “The 12 Safety Rules”. 3.**Abrupt stop or taper?** Stopping outright suits most plant-cannabis users, even heavy ones, because the recovery clock starts at once. A gradual taper is reasonable if you use several times a day for years, have an anxiety disorder, or have failed abrupt stops. It lowers peak intensity but lengthens the process. There is no single best way. Choose with your history. The Kernel’s Case 07 favours treating the anxiety first and reducing gradually for the anxious profile **[Kernel hypothesis]**. 4.**Medicines with some evidence for cannabis use disorder** are a prescriber’s decision. **[Emerging]** for all:

- o**Gabapentin:** short-term only, for severe early withdrawal. It carries its own dependence risk, and a prescriber must manage how it is stopped.
- o**Buspirone:** a non-sedating anxiety medicine that suits anxiety-driven use. It takes weeks to work.
- o**Low-dose quetiapine:** occasionally used for severe insomnia, time-limited and second-line.
- oDose and duration: with your clinician.

CBD: the contradiction, resolved

The Kernel says two things. One is that CBD (no THC) can ease withdrawal and bridge a taper. The other is that you should avoid all cannabis products, CBD included, for the first 30 days so the system can reset. The honest reading:

- CBD for cannabis withdrawal is **[Emerging]**: small studies, mixed results. Sleep effects are not well mapped.
- The cautious default for an abrupt stop is **no CBD for the first month**.
- A clinician-guided, pharmaceutical-grade CBD bridge may be reasonable in a gradual taper for an anxious person. It is not a way to keep using. Retail products vary a lot.
- CBD is cleared by liver enzymes (CYP2C9 and CYP3A4), so people who clear drugs slowly reach higher levels and it can interact with other medicines.
- **Whether to use it is a decision for you and your clinician.** Neither rule is proven.

Supplements: honest status

Supplements are optional and secondary. Dose with your clinician or pharmacist, and run every addition through a pharmacist and an interaction checker (Drugs.com or Medscape).

Item	Status
NAC (N-acetylcysteine)	[Emerging] — **promising and uncertain.** A trial in adolescents was positive. A larger adult trial was not. Earlier Kernel text said "multiple RCTs" and overstated it.
Magnesium, L-theanine, omega-3, zinc	Commonly used for anxiety and sleep support. Evidence is modest. [Emerging]
5-HTP	Only on a physician's advice, and never with an SSRI, SNRI or other serotonergic drug (serotonin syndrome risk).
5-MTHF, methylcobalamin, active B6	Only if testing or a clinician suggests it. **SAMe** can trigger mania in bipolar disorder.
PEA, caryophyllene, echinacea, lion's mane	Plausible, thinly studied. [Kernel hypothesis]
Research peptides (the Kernel lists several, including Dihexa)	Research compounds with little human data. Not a self-start step. Skip.

The first weeks

What the Kernel describes, and what matches clinical experience:

When	What it's like
Hours 0–24	Mild restlessness, irritability, trouble falling asleep. Easy to miss.
Days 1–3, "the Emergence"	Peak irritability, anxiety, insomnia, night sweats, vivid dreams, loss of appetite. The anxiety is real.
Days 3–10, "the Flattening"	Low mood, no pleasure, fog, broken sleep. **This is when most people relapse**, not from a surge of craving but because life feels colourless. It passes.
Weeks 2–4, "the Gray" When	Slow improvement with big swings. Emotions return, including negative ones without the buffer. That can be unsettling. What it's like
Months 1–3	Calm and pleasure come back. Activities that felt flat start to reward.

When	What it's like
Months 3–12 and beyond	CB1 receptors and the endocannabinoid system recover toward baseline. The Kernel calls this one of the faster recoveries in addiction medicine.

The timing above is the Kernel's picture of a typical course. **[Kernel hypothesis]** for the later phases. Individual courses vary, and heavy long-term use may take years for full deep recovery.

Sleep is the top priority

- Cannabis suppresses REM sleep. Vivid dreams in early withdrawal are REM rebound. They are not a symptom to drug away. Expect them for roughly 2 to 6 weeks. Night sweats usually settle within 7 to 10 days. Sleep may take 4 to 8 weeks to normalise.
- Do not reach for sleep aids that suppress REM. Ask a pharmacist before using any.
- The Kernel says insomnia is the single most common reason for return to use. Do not skip this step.
- Persistent insomnia beyond a few weeks: tell a clinician.

The 5-minute craving interrupt

The craving is rarely a surge. It is usually a drift toward the familiar fix when anxiety, insomnia or boredom gets loud. When it comes:

1.**Name the state** underneath it: anxious, bored, can't sleep, socially uncomfortable. 2.**Breathe** with long exhales for a minute or two. 3.**Change one thing** in your environment: stand up, go outside, call someone. 4.**Do something physically demanding** if you can: a run, a hard walk, cold water. 5.**Write it down:** trigger, intensity (0–10), what you did, what happened. After three weeks you will know your pattern better than anyone.

Common trigger states, and what to do instead: **anxiety loop** (breathing, a walk, nature, therapy); **insomnia** (the sleep plan, wind-down, NSDR or yoga nidra); **boredom/flatness** (novelty, strenuous movement, and the expectation that it passes); **social anxiety** (low-stakes settings first, preparation); **pain** (plan with your physician, since blanket abstinence advice fails people with real pain); **creative block** (natural flow is slower to return but builds); **the evening ritual** (keep the time and place, change the content: tea, journaling, stretching).

Rebuilding

Treat what it was treating

- **Anxiety.** If it was there before cannabis and is still clinical after 4 to 8 weeks off, it needs its own treatment (therapy, and medication if your clinician recommends it). Depression that came first or outlasts withdrawal also needs treatment.
- **ADHD.** If focus is still poor at three months or more, ask for an evaluation. Cannabis is a common self-treatment for inattentive ADHD.
- **PTSD.** Cannabis recovery without trauma treatment is incomplete.
- **Pain.** For genuine medical pain, plan with your physician rather than assuming abstinence alone will work.

Natural architecture: build your own off switch

The Kernel's idea is that the calm cannabis gave you can be rebuilt from inside. Plausible and low-risk, though strong claims about brain chemistry here are **[Emerging]** at best:

- **Hard aerobic movement**, 30 minutes or more, most days. Gentle movement alone often isn't enough.
- **A creative practice with depth**: music, writing, art, code. Something with a long learning curve.
- **A daily contemplative practice**: breathing, meditation, journaling, prayer.
- **Laughter and play**, scheduled as deliberately as exercise. Serious people forget this.
- **Nature**, weekly at least; **one to three deep relationships**; **a project bigger than you**.
- Do not treat "runner's high is entirely endocannabinoid", "meditation changes CB1 sensitivity" or "fasting raises anandamide" as settled. They sit at the weak end of the evidence.

Change the context

Cue reactivity is specific: the couch at 9 pm, the car on the way home, the friends who smoke. You may need to change more than you expect. For daily users, cannabis is often part of identity, which leaves a vacuum. Fill it on purpose. See the Handbook chapters on Clarity, Restoration and Manning, and on cues and environment.

Genetics and tests

All of this is optional. **Never delay starting for test results.**

- **Psychosis genes (AKT1, COMT):** the Kernel cites AKT1 (rs2494732) and COMT Met/Met as psychosis-risk markers and, for AKT1 C/C, a roughly sevenfold risk with frequent use. **[Emerging / mixed]** The findings are inconsistent. The best-known COMT result actually favoured the *other* (Val) allele, and

neither gene is a validated stand-alone test. **Use your clinical history instead:** earlier paranoia or an episode, family history, early start, daily high-potency use. If your history is positive, that matters more than any genotype. If your genes look "clear", that does not make cannabis safe.

- **Anxiety/mood-related genes (COMT, MTHFR, SLC6A4):** the Kernel's Sage profile and methylation ideas. [Kernel hypothesis]
- **FAAH (C385A):** anandamide lingers longer, so some natural stress resilience but possibly faster receptor downregulation. [Emerging]
- **CYP2C9 (slow metabolisers):** THC may last two to three times longer and CBD levels run higher. [Emerging] Useful to a prescriber.
- **DAT1/DRD4:** suggest ADHD, but ask for an evaluation instead.
- Ask the lab for a standard variant file (VCF). A methylation assay (WGBS) does not call variants like MTHFR C677T.

Milestones

Time	Focus	What the Kernel projects
0–3 months	Get through the Emergence and Flattening; psychosis screen; repay the sleep debt; replace the evening ritual; treat anxiety	Emotional range returns by weeks 2–4; sleep normalises over 4–8 weeks; real calm and reward by months 1–3
3–12 months	Build movement, creative and contemplative practice; review medicines; watch for alcohol	Endocannabinoid system near baseline with support; motivation returns
Year 1–2	Identity after the "smoker" self; treat anything still unresolved	Deep recovery continues; some changes may be partial after heavy long-term use
Years 3, 5, 10	Maintenance, medication review, Manning (guiding others), alcohol-transfer watch; plan for settings where cannabis is legal and routine	Years 3–10 are projections, not data

The Kernel gives 12-month figures for two archetypes (a 31-year-old whose anxiety drove daily use, and a 19-year-old with psychosis). These are **Kernel projections**, not trial results. For the anxious profile they run higher with an anxiety-first plan (65% cessation or major reduction vs 30% standard). For the psychosis profile cessation plus psychiatric co-management is a precondition. Do not read them as promises.

What changes the outcome: stopping without treating the anxiety; skipping sleep; underestimating vapes and concentrates; ignoring psychosis history; swapping to alcohol; leaving the ritual and cues in place;

leaving depression, ADHD, PTSD or pain untreated; having no plan for days 3 to 10. **A lapse is information and a medical risk** (tolerance has fallen). Note what state was underneath it and adjust.

FOR CLINICIANS

- Screen for psychosis history, family history, age of onset and potency before anything else. Use history over genotype. AKT1/COMT findings are inconsistent.
- Assess for co-occurring anxiety, depression, ADHD, PTSD and pain once abstinent for 4 to 8 weeks.
- Ask about alcohol and other sedative use. Watch for substitution.
- NAC: promising but uncertain (positive adolescent trial, larger adult trial negative). Gabapentin, buspirone and low-dose quetiapine are off-label adjuncts. Time-limit gabapentin and quetiapine.
- CBD: limited evidence; CYP2C9/3A4 interactions.
- Distinguish synthetic cannabinoid toxicity and withdrawal from plant cannabis. The former needs medical care.

For families and supporters

- Do not shame. Cannabis is often treating something real.
- Expect days 3 to 10 to look like depression or laziness. It is withdrawal and it passes. Watch for any suicidal talk and call 988.
- New paranoia, strange beliefs, or hallucinations are a medical matter. Get a psychiatric evaluation and do not argue.
- Help with sleep, food, movement and a replacement for the evening ritual.
- Watch for a quiet swap to alcohol.

KEY POINTS

- Plant-cannabis withdrawal is real but rarely dangerous. K2/Spice is a different, medically risky substance.
- Screen for psychosis first. Clinical history beats AKT1/COMT genetics.
- Days 3 to 10 are the relapse window. Plan for them. Protect sleep.
- Treat the anxiety, ADHD, trauma or pain that cannabis was managing.
- CBD and NAC are both promising and unproven. Decide with a clinician.
- A break is not a reset. A lapse is information and a medical risk.

Nicotine

In this chapter. Cigarettes, vapes, pouches, snus, chew, hookah, cigars and pipes. Nicotine withdrawal is not medically dangerous, but quitting works far better with medication, and the medicines have real cautions. If you take psychiatric or some other medicines, **tell your prescriber before your quit date**. US-centred. **Emergency box** - Chest pain, sudden breathlessness, or sudden severe chest or lung symptoms (especially in a vaper): **911**. - Thoughts of suicide, or a sharp mood drop while quitting: **988** (call/text). Crisis Text Line: text HOME to 741741. - Seizure, or a first-time confusion/agitation episode after starting a quit medicine: **911**. - Free quit support: **1-800-QUIT-NOW**; Smokefree.gov. SAMHSA **1-800-662-4357**.

What it does and why it hooks people

- Nicotine reaches the brain in about ten seconds when smoked or vaped. It activates nicotinic receptors (mainly the α4β2 type) and releases dopamine. **[Established]**
- Chronic use makes the brain adapt around nicotine. Without it you get withdrawal: irritability, anxiety, poor concentration, low mood, broken sleep, appetite. **[Established]**
- Smoke adds substances beyond nicotine, including compounds that block the breakdown of dopamine and serotonin (MAO inhibitors). That is part of why replacement products do not feel quite like smoking, and part of why mood can drop after quitting. **[Established]** for the compounds, **[Emerging]** for how much they matter clinically.
- It is the nicotine, not the delivery, that drives dependence. Vapes, pouches, snus, chew and hookah differ in physical harm, not in dependence.
- Cravings peak in about 3 to 5 minutes and fade if not fed. **[Established]**

Signal, not sin. Smoking concentrates in people with psychiatric conditions. Approximate rates the Kernel cites: schizophrenia 70–90%, bipolar disorder 40–70%, depression 40–60%, ADHD 35–40%, alcohol use disorder 70–80%. For many, nicotine was doing a real job: focus, mood, anxiety relief, stress ritual. Quitting without managing that condition often fails. That is not weakness.

Product	Harm to know	Note
Cigarettes	Lung cancer, COPD, heart disease, stroke	Most-studied for quitting

Product	Harm to know	Note
Vapes	Lung injury (EVALI, linked to vitamin E acetate in some products); long-term risks less clear	Fine as a step only with an end date
Pouches	Gum irritation; no combustion	Lower harm, still dependence
Snus / chew / dip	Oral, throat and pancreatic cancer; gum disease	Lower quit rates in some studies
Hookah	A session can deliver a lot of nicotine and carbon monoxide	Often wrongly seen as milder

Danger points

- **Medicine interactions when you stop smoking.** Tobacco smoke speeds the liver's clearance of some drugs (via the CYP1A2 enzyme). After quitting, **levels of clozapine, olanzapine and theophylline can rise**, sometimes to toxic levels. **[Established]** Tell your prescriber before the quit date so levels and dose can be monitored. Do not adjust these medicines yourself. Caffeine also hits harder after quitting, because smoke had been speeding its clearance. See the Caffeine chapter.
- **Bupropion** lowers the seizure threshold. It is not for people with a seizure history, an eating disorder, or current alcohol withdrawal.
- **Mood.** Quitting can unmask or worsen depression or anxiety, especially in people with a psychiatric history. Plan for monitoring.
- **Varenicline.** Vivid dreams are common. The 2016 psychiatric safety warning was revised, and current evidence shows no clearly raised psychiatric risk at standard doses. **[Established]** Report any mood or behaviour change to your prescriber.
- **Pregnancy or breastfeeding:** ask your prescriber about options.
- **Open-ended substitution.** Vaping or pouches used as a "forever" bridge keep the dependence alive. Give any cessation tool an end date.
- **"Just one."** One cigarette restarts the conditioning. The Kernel calls this pharmacology, not perfectionism.

Getting safe: medicines and who supervises

Medication roughly doubles to triples quit rates compared with placebo, and the best results come from medicine plus behavioural support (a quitline or counsellor). **[Established]** The exact multipliers in the Kernel are its own and vary across trials.

Option	Evidence and use
Varenicline	Generally the most effective single medicine. [Established] Eases withdrawal and blunts the reward from smoking.
Combination nicotine replacement (patch for baseline plus gum or lozenge for spikes)	Better than a single product. [Established] A returning craving on a patch usually means add a rescue form, not "the patch isn't working".
Bupropion	Helps, especially with depression. [Established] Mind the seizure caution.
Varenicline plus patch	Highest quit rates in some trials. [Emerging] Underused because the medicines are presented as either/or. Ask.
GLP-1 drugs (semaglutide, tirzepatide) Option	Reports of spontaneous cutting down; trials ongoing. [Emerging] Not approved for smoking cessation. Evidence and use
Cytisine / cytisinicline	See below.

Any primary care prescriber can prescribe varenicline and bupropion. Ask by name. Dose, timing and duration: with your prescriber. Medicines usually run at least about 12 weeks.

Varenicline or bupropion? The Kernel contradicts itself

Chapter text calls varenicline the most effective single medicine and starts it before the quit date. A case study (a 55-year-old who failed 11 attempts on patches, gum and varenicline) says bupropion has "the strongest evidence of any medication" and favours months of biological preparation before quitting. Both can be partly right for different people:

- **Default first choice for most smokers:** varenicline, alone or with a patch, or combination replacement. [Established]
- **Bupropion is a good fit** if depression is part of the picture, if varenicline did not work or was not tolerated, or if a dopamine-driven profile fits. The Kernel pairs it with the Warrior (fast dopamine clearance) pattern. That pairing is a [Kernel hypothesis].
- **Do not postpone quitting for months** of preparation. Starting medicine one to two weeks before a quit date is the standard approach. If you have a serious psychiatric illness, how much stabilisation comes first is a **specialist decision**.
- The Kernel's quit-rate figures (about 15–25% at 12 months with any single intervention) are rough and are not results of its own trial.

Cytisinicline: updated status

The Kernel describes cytisine (Tabex, used for decades in Eastern Europe) as comparable to varenicline and "available online". As of the project's check, **the US FDA issued a complete response letter for cytisinicline in June 2026**, citing manufacturing and labelling issues, not efficacy or safety. The company plans to resubmit in late 2026. It is **not approved in the US**. Products sold online are unregulated, with unknown contents and strength. Ask your prescriber before trying any. Verify current status, which may have changed.

The first weeks

- **First 72 hours** are the most acute; **week 1** the hardest; after about week 2 the physical withdrawal has largely settled. What remains is behavioural. Sleep is choppy with vivid dreams, settling in 2 to 4 weeks. Receptor systems take roughly 4 to 6 weeks to recover substantially. **[Kernel projection]**
- Anxiety and low mood now are real withdrawal, not weakness.
- **Craving map and fixes:** habit cues (coffee, after meals): change the sequence. Stress: long-exhale breathing, a walk, treat the stress. Social cues: tell people and keep a replacement product handy. **The "I deserve one" moment:** name it as a depleted system seeking relief, not a decision.
- **The 3-minute interrupt:** set a timer; breathe with long exhales; use a rescue form of replacement (that is the medicine working); drink water; change location; wait it out.
- **Using replacement or varenicline while still smoking** is not failure. It can be a harm- reduction phase linked to better eventual quitting.
- **Weight:** a gain of about 4 to 8 pounds is common, mostly in the first three months, and the health trade-off still favours quitting. Do not let weight fear keep you smoking. If it is the barrier, talk to your prescriber about options (including exercise and GLP-1 drugs).

Rebuilding

Treat what the nicotine was treating

Before the tobacco is removed, have a plan for:

- **Depression:** psychiatric care; bupropion is one option; exercise.
- **ADHD:** evaluation and treatment. Nicotine sharpens focus, and treating ADHD is the sustainable replacement.
- **Anxiety:** therapy, breathing practice, and prescriber options such as buspirone.
- **Schizophrenia or bipolar disorder:** work closely with the treating psychiatrist, including the medicine-level cautions above. Without psychiatric management, quitting often fails.

Natural architecture (what each cigarette did)

Function	Replacement
Dopamine and reward	Daily aerobic exercise, cold showers, something with real challenge. The Kernel calls exercise the most impactful behavioural help beyond medicine and says it doubled quit success in some studies. **[Emerging]**
Anxiety and stress	Long-exhale breathing, practised until it is as automatic as reaching for a cigarette
Focus	Exercise, sleep, ADHD treatment if indicated. Expect 4 to 6 weeks for the brain to adjust
Belonging	The smoke break was social. Walk with colleagues and schedule non-smoking time with people
Mood	Exercise, psychiatric care, bupropion if your prescriber recommends it
Supplements: status	

NAC, choline sources, lion's mane, huperzine-A, tyrosine, rhodiola and antioxidants are in the Kernel's stack. The evidence is thin. **[Emerging / Kernel hypothesis]** Dose with your clinician or pharmacist. Interactions are real: **5-HTP only on physician advice and never with an SSRI or other serotonergic drug**, and anything affecting dopamine or the heart needs a clinician. Medicine and behavioural support come first. Supplements do not replace them.

Body recovery

A timeline widely used in public-health guidance **[Established]**: blood pressure and pulse normalise in about 20 minutes; carbon monoxide clears in about 12 hours; circulation and lung function improve within weeks; heart disease risk is halved within about a year; stroke risk reaches a non-smoker's within about five years; lung cancer risk halves within about ten years. Ask about spirometry, blood pressure and lipids, dental checks, and **lung cancer CT screening if you have smoked heavily (20+ pack-years) and are aged 50 to 80**.

Genetics and tests

Optional. **Never delay starting for test results.**

- **CHRNA5/CHRNA3/CHRNB4 (rs16969968 A allele):** linked to heavier smoking, harder quitting, higher lung cancer risk, and better response to varenicline. **[Established]** for dependence and lung cancer associations; the medicine-matching is **[Emerging]**.

- **CYP2A6:** slow metabolisers need fewer cigarettes, get more per cigarette, and may quit more easily. It can guide replacement choice. [Established] for the metabolism; [Emerging] for dosing decisions.
- **COMT Val/Val ("Warrior"), MTHFR, DRD2 A1, SLC6A4 short/short:** the Kernel links these to dopamine-driven use, mood drop on quitting, reward deficiency and anxiety. [Kernel hypothesis]. Do not read your personality from a genotype.
- Free clues without testing: a pack a day and harder quitting than peers suggest a CHRNA5 pattern; fewer cigarettes but each feels necessary suggests slow CYP2A6; severe mood drops on past quit attempts suggest depression that needs its own plan.
- Ask the lab for a standard variant file (VCF), not a methylation assay.

Milestones

Time	Focus	Kernel projection
Before quit date	Prescriber visit, medicines started, replacement ready, psychiatric plan, medicine-interaction check	Medicine usually begins before the quit date
0–3 months	Quit date to week 12: acute 72 hours, hardest week 1, craving interrupts, medicine course	Physical withdrawal largely settles after week 2
3–12 months Time	Risk window. Relapse risk stays raised for about a year, especially with stress Focus	Most people still quit at 12 months stay quit Kernel projection
Year 1–2	Exercise as the replacement; underlying condition treated; weight settled	
Years 3, 5, 10	Off medication with a written lapse plan; stress and grief as triggers; Manning (quit coaching); "one cigarette restarts it" never expires	Years 3–10 are projections

The Kernel's case figures for one archetype (bupropion plus exercise: 67% abstinent at 12 months vs 20% standard) are **Kernel projections**, not trial results.

What changes the outcome: willpower alone; starting medicine only on quit day; single replacement instead of combination; removing tobacco before treating depression, ADHD, anxiety or psychosis; ignoring rituals; "just one"; weight fear; vapes or pouches with no end date. **A lapse is information and a medical risk to your plan.** Call your prescriber or quitline, restart replacement, and do not wait for "a fresh Monday". Peer support: Nicotine Anonymous.

FOR CLINICIANS

- Before the quit date, review all medicines for CYP1A2 substrates: **clozapine, olanzapine, theophylline** (and consider others). Plan levels and dose monitoring. Counsel on increased caffeine effect.
- Varenicline remains first-line; combination NRT and varenicline plus NRT are effective. Bupropion suits comorbid depression and prior varenicline failure; check seizure risk, eating disorders and alcohol withdrawal.
- Psychiatric comorbidity: coordinate with the treating psychiatrist before and during cessation.
- Cytisinicline is not FDA approved (complete response letter, June 2026). Advise against unregulated online products.
- Offer lung cancer screening where eligible.
- The Kernel's quit-rate multipliers and pharmacogenomic matching are its own projections.

For families and supporters

- Do not nag. Ask what would help on the hardest days: the first week and the stress points.
- Expect irritability, low mood and poor sleep for a few weeks. Call 988 for any suicidal talk.
- If your relative takes clozapine, olanzapine or theophylline, make sure their prescriber knows they are quitting.
- Help replace the smoke break with something social.

KEY POINTS

- Medicine plus support roughly doubles to triples quit rates. Willpower alone often fails.
- Tell your prescriber about psychiatric medicines before quitting: clozapine, olanzapine and theophylline levels can rise.
- Varenicline (alone or with a patch) is the usual first choice. Bupropion fits depression or prior varenicline failure. Do not postpone quitting for months.
- Cytisinicline is not approved in the US as of the last check. Be wary of online products.
- Treat the depression, ADHD or anxiety that smoking was covering.
- "One cigarette" restarts it. A lapse is information. Call a prescriber or 1-800-QUIT-NOW.

Inhalants and Poppers

In this chapter. Three different substance families share one route (breathing them in): **volatile solvents and aerosols** (glue, spray paint, gasoline, butane, toluene, **computer duster and other aerosol propellants**), **nitrous oxide** (whippets, nangs), and **poppers** (alkyl nitrites). Each has its own dangers and its own recovery. Use the section that fits, and read all that apply. US-centred. Shared rules are in the Handbook chapter "The 12 Safety Rules".

Emergency box - **Someone collapses after inhaling anything** (especially computer duster, aerosols, butane, solvents): call **911**, start CPR if they are not breathing, and use an AED if available. **Do not shake, startle or move them to a car.** - Blue or grey lips, trouble breathing, confusion, chest pain after poppers or nitrous: **911**. - Tingling, numbness or weakness in hands or feet after nitrous: not an emergency call, but get seen **now** (see below). - Blurred or distorted central vision after poppers: urgent eye exam. - Poison Control **1-800-222-1222**. Crisis: **988** (call/text). SAMHSA **1-800-662- 4357**. Teen Line **1-800-852-8336**. Crisis Text Line: text HOME to 741741.

What they do and why they hook people

Family	What it does	Main hook
Solvents and aerosols	Depress the nervous system (like alcohol), block NMDA receptors and dissolve into cell membranes	Warmth, numbness, escape, belonging. It is common among adolescents, street-involved and economically excluded people.
Nitrous oxide	Blocks NMDA receptors (like ketamine), giving 30 to 90 seconds of dissociation. It also destroys vitamin B12.	A quick "door" to an altered state. Balloons in a row are a social ritual.
Poppers Family	Release nitric oxide and relax smooth muscle: a head rush, What it does and relaxation of the anal sphincter. Little effect on brain receptors.	Sexual function and shared community ritual. Main hook Compulsion is mostly conditioning.

Signal, not sin: for solvents the signal often points to cold, hunger, pain, trauma and no belonging. For nitrous it often points to a wish for relief from an ordinary mind. For poppers it points to sexual function and community.

Danger points

Solvents and aerosols (including computer duster)

- **Sudden sniffing death.** Solvents make the heart hypersensitive to adrenaline. A startle, panic or exertion after inhaling can trigger a fatal heart rhythm. **It can happen on the first use, at any age, with no warning. There is no safe amount.** [Established]
- **Computer duster and household aerosols are on the highest-risk list.** Aerosol dusting products (often refrigerant-type gases), butane (lighter fluid, gas canisters), and aerosol propellants can deliver a very high concentration very fast and sensitise the heart. Deaths from these are documented. The Kernel's source text lists them only as "aerosol cans (dusting)", which understates this everyday product.
- **Method matters.** The Kernel ranks bagging (a bag over the head) as highest risk, followed by rag-huffing, spraying directly into the mouth ("chroming") and sniffing from a container. Bagging adds low oxygen: you can lose consciousness before you can remove it. Any exertion right after inhaling adds risk.
- **Fire.** Butane and many solvents ignite. Burns to face and airway need 911.
- **Chronic damage:** toluene (white-matter damage, balance problems, kidney problems with profound weakness, hearing loss), n-hexane (nerve damage: progressive numbness and weakness in hands and feet), butane and aerosol propellants (highest heart risk), acetone (liver damage with heavy use). Aspiration of solvent into the lungs can cause breathing trouble. [Established]
- **Withdrawal** from severe daily dependence resembles alcohol withdrawal, usually milder, and seizure is possible. If you use heavily every day, get medical assessment before stopping. **Never stop alcohol, benzodiazepines, Z-drugs, GHB or high-dose gabapentinoids suddenly** if you also use them. See "The 12 Safety Rules".
- **Malnutrition** is common. Thiamine deficiency can cause Wernicke encephalopathy (confusion, unsteady gait, eye movement problems), a medical emergency.
- **If someone is found unconscious after solvents and is breathing:** put them in the recovery position and call 911. Do not shake them awake.

Nitrous oxide

- **Vitamin B12 destruction.** Nitrous inactivates B12. Frequent use can cause a functional B12 deficiency and a spinal cord injury called **subacute combined degeneration (SACD)**. It often appears weeks after use and is often misattributed. [Established]

- **Any tingling, numbness or weakness in the hands or feet after nitrous means stop and get tested and examined now.** This is the window when it is most reversible. Ask for serum B12, methylmalonic acid (MMA) and homocysteine. A normal serum B12 does not rule out the problem, because nitrous causes a *functional* deficiency. Ask for a neurological exam. Spinal MRI is a clinician's decision.
- **Stages** (the Kernel's account, consistent with clinical teaching): early tingling is highly reversible with prompt treatment; intermediate weakness, unsteady gait, loss of fine hand control and electric-shock sensations down the back are partly reversible and need urgent neurology; late paralysis, cognitive and psychiatric change and incontinence are incompletely reversible.
- **B12 treatment** for established symptoms is usually by injection from a physician. Do not wait to "see if tablets are enough". The active form (methylcobalamin) is favoured in Kernel text. Which form and how: **with your physician**.
- **Folic acid without B12 is dangerous in this setting.** Folate alone can mask or worsen B12-related nerve injury. (The Kernel's explanation of the mechanism is loosely stated, but the warning stands.) Do not take folic-acid supplements on your own for this. Ask your clinician which folate form, if any.
- **Higher risk:** frequent use (many balloons per session, repeated sessions); low B12 to begin with (vegan or vegetarian diet, older age, metformin, pernicious anaemia or other B12 malabsorption); and possibly MTHFR variants. **[Emerging]**: the idea that MTHFR variants "dramatically" raise nitrous toxicity rests mostly on case reports and one scoring table, not on strong studies. People with a B12 absorption problem should not be exposed at all.
- **Other emergencies:** suffocation from displaced oxygen in closed rooms (blue lips, collapse: fresh air and 911); frostbite from pressurised canisters; falls (coordination is lost within seconds. Stay away from water, heights, traffic).
- **Mood:** severe B12 deficiency can cause depression and psychiatric symptoms. Get the B12 picture before assuming a primary psychiatric cause.

Poppers (alkyl nitrites)

- **Poppers plus erectile dysfunction drugs or riociguat can be fatal.** Sildenafil (Viagra), tadalafil (Cialis), vardenafil (Levitra), avanafil (Stendra) and riociguat (Adempas, a pulmonary hypertension drug) all lower blood pressure. Combined, the drop can cause fainting, heart attack and death. **Never combine them.** Tadalafil can stay active for up to 36 hours, so a "weekend pill" the day before still counts, and daily low-dose tadalafil means never using poppers. Ask your pharmacist about any other blood-pressure or heart medicine. **[Established]**
- **Methemoglobinemia.** Poppers can change hemoglobin so it cannot carry oxygen. Signs: grey-blue lips, tongue or skin, headache, dizziness, shortness of breath, confusion, chest pain. Call 911. It is treated in hospital. **The highest-risk scenario is swallowing poppers. They are for inhalation only.** G6PD deficiency sharply raises the risk. If you are deficient, the risk is high enough to warrant stopping. **[Established]**

- **Maculopathy.** Some formulations (isobutyl, isopropyl, and cyclohexyl nitrite, banned in the EU for this reason) are linked to retinal damage that can permanently blur central vision. It can appear days to weeks after use, with no warning. Any blurring, distortion or dark spot in central vision needs an urgent eye exam with a macular OCT. Some cases reverse if caught early. **[Established]** The idea that amyl nitrite is "safer" is only a tendency, not a guarantee. **[Emerging]**
- **Mixing.** Poppers may be part of chemsex or other drug use. Treat the whole pattern, with the medically dangerous substance first (see the Chemsex chapter).
- **Repeated hits** add to blood pressure and methemoglobin risk, especially alongside an ED drug.

Getting safe: the medical picture

Solvents and aerosols: a medical and neurological assessment first, not a supplement stack. Ask for a neurological exam, electrolytes and kidney tests, liver tests, an ECG and a hearing check. Tell the clinician the specific product (toluene, n-hexane, butane, aerosol propellant), because each has its own toxicity. Ask about thiamine. There is no medication replacement and no antidote. Recovery is nutrition, repair, structure and time.

Nitrous oxide: B12, MMA and homocysteine tests, a neurological exam, and treatment decisions with a physician. B12 injection for symptoms is a physician's call. Stop the nitrous now. The tests guide treatment, not whether to stop.

Poppers: there is no withdrawal and no medical detox. Safety checks are the medical work: an ED-drug and medicine review, a G6PD blood test (especially if of African, Mediterranean, Middle Eastern or South Asian ancestry, where deficiency is more common), an eye exam if you have any visual change or heavy past use, and blood pressure checks in the first weeks (it may run slightly higher without the vasodilation).

The first weeks

- **Solvents:** cravings follow cold, hunger, boredom and company. The structure is as much the treatment as the chemistry (see "Rebuilding"). Cognitive function improves over roughly 6 to 12 months of abstinence. **[Emerging]**
- **Nitrous:** the pull is for the 60-second shift in state. Plan for festivals and parties. Stay in touch with your doctor about any new symptom.
- **Poppers:** craving is conditioned. It fires when the sexual arousal and behaviours that were paired with poppers arrive, even after you have decided to stop. Practising without them can feel different or less comfortable at first. That is the conditioning fading, not proof you need them. For a craving: name what you are craving (function, ritual, belonging), change the setting if you can, breathe with long exhales, contact someone who understands, and log what happened.

Rebuilding

Solvents: conditions before chemistry

The Kernel says solvent recovery that addresses only the pharmacology will fail. Its priorities:

- **Housing, food, warmth, safety.** The Kernel calls housing stability the single most important determinant of recovery. That claim is plausible but unsourced. **[Kernel hypothesis]** Unstable housing is associated with continued use regardless of treatment intensity.
- **Nutrition:** protein, thiamine, folate, zinc and iron, treated as a medical issue.
- **Trauma-informed care**, not standard addiction counselling alone. Most people with chronic solvent use carry trauma.
- **School, work and training** for young people, so there is a real future to move toward.
- **A new community.** Using is often communal. Replace the group on purpose.
- **Exercise**, as nerve and brain repair support. If you are a helper: outreach, shelter, food, school, and a person who keeps showing up.

Nitrous: the earned alternative

The pull is a quick, easy altered state. Slow breathing, non-sleep deep rest (yoga nidra) and meditation are the durable versions, but they take weeks to months of daily practice. **[Kernel hypothesis]** Be careful: hyperventilation-based breathwork can provoke panic or dissociation in people with psychosis history, seizure history, heart conditions or persistent dissociation, and is not appropriate with unexplained neurological symptoms. Ask your clinician first.

Poppers: unlearning the conditioning

- **Therapy** for the conditioned sexual context, ideally with a clinician comfortable with sexuality and LGBTQ+ care. Practising without poppers is discomfort tolerance, and it is how the association fades. No trial data support a timeline.
- **Partners and community.** Poppers are heavily normalised in gay male sexual culture. Stopping may mean telling partners, renegotiating a shared ritual, and finding spaces where not using is ordinary. The Kernel's position: your sexuality and your community are not the problem. **The target is the loss of agency**: using every time regardless of choice, being unable to have sex without them, escalating. That, not how often, is the test.
- If shame or trauma is involved, see the Trauma chapter.

Supplements and the repair stack

For nitrous, methylcobalamin, 5-MTHF (not folic acid), active B6, and omega-3 appear in the Kernel's repair stack; for solvents, 5-MTHF, methylcobalamin, NAC, omega-3, magnesium and thiamine. These are

plausible repair supports, not proven treatments. **[Emerging / Kernel hypothesis]** Which form, which dose, and whether injection is needed: **with your physician**. Run additions past a pharmacist and an interaction checker.

Genetics and tests

Optional, and the labs matter more than the genome. **Never delay starting for test results.**

Test	Why
B12, MMA, homocysteine (nitrous)	Directly guides treatment. **[Established]**
Screening for pernicious anaemia or B12 malabsorption (nitrous)	Such people should not be exposed
MTHFR, MTR, MTRR (nitrous)	Plausible risk modifiers. **[Emerging]**
G6PD (poppers)	Practical, simple blood test. **[Established]**
GABRA2, MTHFR, BDNF (solvents)	The Kernel says the genome is less specific here. **[Kernel hypothesis]**

Milestones

Time	Focus	What the Kernel supports
0–3 months	Medical assessment first; stop; labs; for solvents, shelter, food and trauma-informed care; for nitrous, treat B12 and act on any tingling; for poppers, ED-drug rule and eye/G6PD checks	Early SACD is highly reversible with prompt treatment; poppers have no withdrawal
3–12 months	Repair, nutrition, structure; conditioned cravings fade with practice	Solvent cognition improves at 6–12 months
Year 1–2	Stable base; nerves and white matter recover	Toluene white matter shows measurable recovery over 1– 2 years in adults; n-hexane neuropathy partly recovers; complete recovery is not guaranteed

Time	Focus	What the Kernel supports
Years 3, 5, 10	Periodic checks; stress, loss and festival settings as triggers; Manning (peer outreach)	Years 3–10 are projections

There are no outcome percentages for inhalants and none are invented here. **What changes the outcome:** delaying testing or B12 treatment after tingling; folic acid without B12; any solvent use at all; returning to the same unstable conditions; untreated malnutrition or trauma; poppers with ED drugs; swallowing poppers; ignoring an eye change; not knowing your G6PD status. **A lapse is information and a medical risk.** For solvents, even one use carries sudden- death risk. For nitrous, note the exposure and get B12 checked if you have any symptoms. For poppers, keep the medical rules and note what was underneath it.

FOR CLINICIANS

- Solvents: ECG, electrolytes and renal function, liver tests, neurological exam, audiology. Identify the agent. Consider alcohol-like withdrawal management with seizure risk. Give thiamine early if malnourished.
- Computer duster and aerosol propellant use warrants a documented sudden-death warning.
- Nitrous: test B12, MMA and homocysteine even if serum B12 is normal. Spinal MRI and neurology for symptoms. Parenteral B12 for established neurological involvement. Avoid folic acid alone. Re-exposure counselling.
- Poppers: screen for PDE5 inhibitors and riociguat. G6PD testing; OCT for visual symptoms. Methylene blue for methemoglobinemia (hospital).
- The MTHFR amplification of nitrous toxicity and the “amyl is safer” idea are weakly evidenced. The housing-as-top-determinant claim is unsourced.

For families and supporters

- Learn the collapse response: **911, CPR, no shaking.** Duster and aerosol deaths happen to healthy teenagers.
- Look for the signals: paint on the face or hands, chemical smell, missing cans, a young person who is cold, hungry or unsafe at home.
- Tingling, numbness, weakness or unsteadiness after balloons is urgent. Take them seriously.
- If someone uses poppers and takes an ED drug, tell them plainly that the combination can kill. No shame, no lecture.
- Support for housing, school, food and safe community matters more than confrontation.

KEY POINTS

- Solvents (including computer duster and aerosols) can cause sudden death on the first use. There is no safe amount. Call 911 and start CPR. Do not shake someone who has collapsed.
- Nitrous oxide destroys vitamin B12. Tingling or numbness means stop and get tested now. Folic acid without B12 is a trap.
- Poppers plus ED drugs or riociguat can be fatal. Never swallow poppers. Report any central vision change.
- Solvent recovery is housing, food, trauma care and community as much as chemistry.
- Poppers are conditioning, not chemical dependence. Therapy and practice work. The target is agency, not shame.
- A lapse is information and a medical risk. Nothing unverified is safe.

Khat

> **In this chapter.** Khat (*Catha edulis*) leaves are chewed fresh in long social sessions across parts of East Africa and the Arabian Peninsula. It is a milder stimulant than its synthetic relatives, but not risk-free, and it is a **community institution as well as a drug**. Unlike other chapters, the Kernel has no dedicated source on khat. This chapter rests on general clinical knowledge, and the genetics and later-year projections are borrowed by analogy from the synthetic cathinone chapters. US-centred. Shared rules: the Handbook chapter “The 12 Safety Rules”.

Emergency box - Chest pain, a racing or irregular heartbeat that does not settle, or fainting: **911**. - Seizure, or psychosis (paranoia, hallucinations, confusion that does not settle): **911** or urgent psychiatric evaluation. - Thoughts of suicide: **988** (call/text). SAMHSA **1-800-662-4357**. Poison Control **1-800-222-1222**.

What it is and what it does

- Fresh khat contains **cathinone**, the compound family behind synthetic cathinones such as 3-MMC and methedrone (see Chapter “Synthetic Cathinones”). It also contains cathine, which is milder and more stable. Chewing releases them slowly over hours, so the effect is generally gentler than the synthetic compounds. **[Established]**
- Cathinone degrades within one to three days of harvest, so **freshness changes strength**, and you cannot judge strength by looking. **[Established]**
- **Legal status** varies a great deal: legal in several countries of origin, controlled in the US, UK and most of the EU. This mismatch is a real problem for people who travel or move. It does not mean the substance changes. For legal risk, see an attorney.

Danger points

- **Heart:** raised blood pressure and heart rate, especially with heavy, sustained use or heart disease. **[Established]**
- **Mouth and teeth:** staining, gum recession and gum disease from hours of chewing. A possible link to oral lesions and cancer with very heavy long-term use is under study and not settled. **[Emerging]**
- **Mind:** khat-induced psychosis is documented with heavy use and needs psychiatric evaluation. **[Established]**

- **Sleep and appetite** are often disturbed.
- **Product outside its home region:** freshness and contamination (for example pesticides) cannot be verified. Nothing unverified is safe.

Getting safe and the first weeks

- Withdrawal is generally milder than other stimulants, nearer to a heavy caffeine or mild amphetamine-type comedown. It is real. Expect tiredness, low mood, irritability, disturbed sleep or vivid dreams, and craving, peaking over the first few days and substantially easing in one to two weeks. **[Established]** (general clinical picture)
- Get a **blood pressure and heart check**, more important with longer, heavier use. Get a **dental exam early**, not only when something hurts. Treat any pain, cracked tooth, receding gum or non-healing ulcer as a medical issue.
- Tools: sleep, regular meals with protein and complex carbohydrates, water, movement. The trough is the system recovering. For the general stimulant comedown, see the Cocaine and Methamphetamine chapters.

Rebuilding

- **The session craving.** The pull is often for the session: a time of day, a group, a multi- hour structure. Name what it is for (the stimulant, the company, the structure). If it is the social part, plan an alternative gathering at the same time and place, so the slot is not empty. Contact someone outside the usual group when the pull hits.
- **Keep what was real, change what was not sustainable.** Same people, same time, without the leaf; a shorter session; a different agreed structure. This is a negotiation with real people who may not be changing. Be patient. Leaving the community entirely rarely holds. Keeping the culture and changing the leaf usually does.
- Treat low mood, anxiety or sleep problems that persist. Supplement ideas borrowed from the stimulant chapters are **[Kernel hypothesis]**; dose and choice with a clinician.

Genetics and tests

By analogy to the synthetic cathinone chapters only. **[Kernel hypothesis]**: COMT, DRD2/ANKK1, MAOA and MTHFR may influence how the session felt and how it escalates. Not tested for khat specifically. Never delay starting for test results.

Milestones

Time	Focus	Basis
0–3 months	Heart and dental checks; ride out withdrawal; renegotiate the session	Withdrawal eases in 1–2 weeks (general clinical knowledge)
3–12 months	Cardiovascular and gum health improve with reduction and active care; new gathering habits	Extrapolated
Year 1–2	Community connection on new terms	Extrapolated
Years 3, 5, 10	Yearly BP and dental checks; gatherings and stress as triggers; Manning; no unverified product, ever	**Reasoned projections, not data**

A lapse is information. Ask what the session was providing that day, and use the interrupt before the next one. Dental damage does not reverse on its own and needs active treatment.

FOR CLINICIANS

- Check BP, heart rate and rhythm, mental state and oral health. Ask about session length, frequency, freshness and co-use.
- Ask about psychosis and sleep. Offer culturally informed care. The social context is part of the clinical picture.
- Legal context matters for patients who travel between jurisdictions.

For families and supporters

- Do not treat the practice as shameful. Help build a substance-free version of the gathering.
- Chest pain, palpitations or paranoia are medical issues even though “it’s just khat”.
- Encourage a dental visit. It is easy to defer and it matters.

KEY POINTS

- Khat is milder than synthetic cathinones but heavy use strains the heart and mouth, and can cause psychosis.
- Withdrawal is real but usually eases in one to two weeks.

- Get a heart check and a dental exam early.
- The session is part of the point. Rebuild the gathering rather than losing the community.
- The Kernel has no dedicated khat source. Treat later-year projections as reasoned guesses.

BEHAVIORAL ADDICTIONS

GAMBLING, SHOPPING, GAMING AND OTHER BEHAVIORAL ADDICTIONS

> **In this chapter:** Compulsive gambling (including sports betting, day trading and crypto speculation), compulsive shopping and spending, gaming, and the quieter dependencies on passive TV, background audio and music during exercise. There is no substance, but the pull can be as strong as any drug's. The core method is the same: block access, name the hunger, meet it directly. Resources are US-centred.

Emergency box: crisis and money - If you have lost money you cannot afford to lose, are hiding it, or see no way out, do not carry it alone. - **Thoughts of ending your life: call or text 988.** Immediate danger: 911. - **National Problem Gambling Helpline: 1- 800-522-4700** (chat at ncpgambling.org/chat). SAMHSA: 1-800-662-4357. Crisis Text Line: text HOME to 741741. - Gambling and debt crises carry an elevated risk of suicidal thoughts. Shame keeps people silent. Tell someone. - If money was taken from someone to gamble or spend, get legal advice. This chapter does not cover that. **Do one thing today, while you are calm:** set the blocks (self-exclusion, removing saved cards and apps, handing someone else access to large sums). The moment of the urge is the worst moment to decide.

What it does and why it hooks people

The Kernel's thesis: the brain's reward circuit does not care whether the input is a drug or a slot machine. The outcome is familiar: lost time, strained relationships, money damage, and needing more to feel less. The stigma differs (the gambler is told they lack discipline; the TV watcher is told nothing), but the recovery architecture is the same. [Established: gambling disorder is a recognized addictive disorder in the DSM-5.]

Variable-ratio reward. Rewards that arrive unpredictably, after a variable number of tries, are the most powerful learning schedule known. Slot pulls, loot boxes, cliffhangers and "one more video" all use it. It is also the hardest pattern to quit, because the next try might be the one. **[Established]**

The universal cycle. Trigger (emotion, body state, place, time) → craving (dopamine fires in anticipation: the wanting, not the having) → behavior → brief real relief → depletion below where you started → the cycle returns.

The pattern is the addiction, not the vehicle. If the hunger is not met directly, it moves to a new host (see "Watch for the mask change").

Five-question test. Is it compulsive (hard to stop once started)? Progressive (more for the same effect)? Continued despite consequences? Used to escape or regulate emotion? Surrounded by shame or secrecy? Three or more "yes" means the cycle is running.

Quick self-check for any activity: - Can I skip it today with no more discomfort than skipping a neutral activity? - Does it feel like a choice or a pull? - Has the time I give it grown? - When I stop, do I feel better, or feel the pull to start? - Is there something I am avoiding that I can name?

The forms it takes

Form	Includes
Gambling	Casinos, sports betting, online poker, lottery and scratch tickets, money fantasy sports, and day trading and crypto speculation (the Kernel calls these gambling "wearing a financial mask")
Shopping and spending	Late-night online shopping, store sprees, collecting beyond use, deal-hunting, auction sites, subscription boxes, big-ticket buys such as cars, credit-card debt
Gaming Form	Loot boxes, guild obligations, progression Includes systems, night raids
Passive media	TV, streaming, the comfort show
Background audio	Radio, podcasts or TV always on
Music dependency in exercise	Cannot finish a workout without audio

Danger points

- **Chasing losses.** Bigger bets or bigger purchases to recover a loss or the relief that did not arrive. This is the moment the structural tools below are built for.
- **Suicide risk** in gambling and debt crises (see the emergency box).
- **Hiding and borrowing.** Secrecy, lying, borrowing and taking money that is not yours. Legal advice matters.
- **The mask change.** Someone quits drinking, is proud at 90 days, and is now gambling daily, shopping compulsively, or gaming ten hours a day. Reward pathways primed by one source respond more readily to others. **[Emerging]** Re-run the five-question test on any new behavior. For substances and behaviors that feed each other, see the relevant substance chapters and The 12 Safety Rules.

- **Willpower alone with full access left in place.** The Kernel says this is where the cycle defeats almost everyone.
- **Windfall thinking.** The big win or the deal that fixes everything does not come. What comes is the payment made today.
- **Gaming and sleep.** Late-night play shifts sleep and worsens impulse control.

Getting safe: block access, stop the bleeding

The hierarchy of protection

Level	What it means	Examples
1. Impossible	The behavior cannot happen	Self-excluded, cash only, no cards, no internet in the bedroom
2. Very difficult	Real effort, enough that a 15- 30 minute craving window passes first	A long drive, a password someone else holds
3. Moderate friction	You can disable it in a determined moment	Timers, basic blocks
4. Willpower only	Full access, only the resolution of the moment	Where the cycle usually wins
Aim for levels 1 and 2. Gambling		

- **Self-exclusion** at every licensed casino, online platform and betting site, before the next urge. Friction is near zero when calm and prohibitive during an urge.
- **Hand over financial control of large sums** to a trusted person. This is not giving up oversight; it is giving up unilateral access. You cannot lose $500 you cannot reach.
- **Scheduled blocks** (such as Cold Turkey or Freedom) on online platforms at high-risk hours (late evening, early morning). Count day trading and crypto speculation as gambling.
- **Treatment.** CBT aimed at the four gambling distortions below is the primary treatment **[Established]**. Naltrexone (an opioid-receptor blocker) reduced gambling urges in some trials; evidence is mixed. **[Emerging]** It is a prescriber's decision.

Four gambling distortions (what CBT targets)

Distortion	What the mind does
Near-miss effect	Two of three symbols feels like almost winning, and motivates more than a plain loss. The machine has no memory.

Distortion	What the mind does
Gambler's fallacy	"Red came up 7 times, black is due." Independent events have no memory.
Illusion of control	Skill in poker or sports betting leaks into the random part.
Chasing	Bigger bets to recover a loss, which raises the risk.

Not recommended during active gambling disorder: turning the gambling drive into speculative investing, "risk capital" or trading. Trading and crypto speculation can be gambling in a new outfit. Redirect the competitive drive into non-financial outlets (see "Meeting the hunger").

Shopping, big-ticket purchases and credit cards

From the Kernel's debt-rebuilding protocol, three structural tools: - **A trusted holder for the first 90 days.** A sponsor, stable relative or financial counselor holds your cards, sees account activity and approves larger purchases. You get a cash allowance for daily needs. It is a crutch for a broken leg: temporary, not humiliation. - **A spending sandbox.** A prepaid card loaded weekly with a fixed discretionary amount, with no credit line or overdraft, as your only card for non-essential spending. When it hits zero, the category is closed. - **Latency injection.** Delete saved payment details, remove shopping apps and promotional emails, block auction sites, and impose a wait of at least 24 hours on any non-essential purchase. Impulses decay when time is inserted. Keep a delay on large purchases permanently.

Added by this edition (not in the Kernel): for cars and other very large purchases, treat listing apps, dealership emails and price alerts like any shopping app; use a far longer wait than 24 hours; have your trusted holder or a counselor see it before you sign; have someone you trust check any financing offer. If a car is expensive and not needed for income, it is the first thing to reassess.

Gaming, streaming and audio

Intention-level fixes fail, so use device-level tools: - Screen Time or Digital Wellbeing limits set on a calm Sunday, not Friday night, and locked with a trusted person's password for the first 90 days. - Scheduled blocks. Delete apps so re-downloading is friction. - Charge phone, controller and remote outside the bedroom. Use an alarm clock. - A sleep line: no gaming after a set time, based on when sleep must start to get about eight hours. - Tell your gaming group the new schedule ("I play Tuesday and Saturday, 7 to 10") so logging off is a plan, not a betrayal.

Stop the bleeding with money (days 0-90)

A debt is a quantity owed, a credit score is a calculation, and an unopened pile of mail is information not yet read. None of them is a verdict on your character. For the full money route, see the chapter on Financial Recovery. In short: 1. **Stop all automatic payments today** that are not essential (streaming, boxes,

memberships). 2. **Do the full accounting.** Gather the mail, open and sort it, list every account, find your monthly surplus, and write one total down. 3. **Spend by priority:** shelter and essential utilities, transportation, food you cook, basic phone, income tools, life-sustaining medical care, minimum debt service (only what prevents catastrophic legal consequences), then everything else after 90 days of stability. 4. **Do not take on new debt to pay old debt.** Settling debts can have credit-report and tax effects. For large or complex debt, especially anything involving gambling debts or legal issues, see a nonprofit credit counselor or a lawyer first.

The first weeks: urges, triggers and the wave

- **See the trigger.** For one week, each time you act or feel the urge, note time, place, who you were with, the prior hour, your body state (hungry, angry, lonely, tired, in pain) and the first thought. Changing the environment before the cycle starts is easier than stopping it midway.
- **Surf the wave.** An urge lasts about 15 to 30 minutes and fades if not fed. Notice it, find it in the body, breathe, watch it rise, peak and fall. Set a 30-minute timer and do something else.
- **Withdrawal from screens and audio** is mild but real: restlessness, discomfort in silence, or a flat mood. It usually eases within days to weeks.
- **A lapse is information.** Tell your trusted person the same day, reset the blocks, and look at the trigger and need underneath. A lapse is not “back to zero.”

Rebuilding: meeting the hunger directly

Every behavior meets a real need: excitement, escape, connection, status, mood. Remove the behavior without meeting the need and it finds a new vehicle. Also look at what it was treating: depression, anxiety, ADHD, trauma. A clinician can help with these.

Behavior	What it provides	Natural equivalent
Gambling	Excitement, the promise of transformation, escape (casinos remove clocks), belonging	Real-stakes skill and competition (athletics, building a business or craft), absorbing flow, the same community without money (a chess club, a competitive circuit)
Shopping	The hunt is the high; the item loses its charge fast; mood regulation, identity (“I am what I own”), an unnamed emptiness	Work on identity and emptiness, not the purchase: real mastery, real connection, direct treatment of mood

Behavior	What it provides	Natural equivalent
Gaming	Designed flow, status, social obligation	Make ordinary life compete: real skills and challenges. Scheduled play. Transplant the skill (strategy into chess or business, reflex into sport, world-building into writing)
Movies and TV	Story, parasocial company, structured time	Books (active construction of the story), making something
Background audio	Never being alone with your thoughts	Progressive silence
Music in exercise	Masks effort	Music-free sessions

Gaming. Flow itself is healthy. The problem is when the game supplies it more reliably than life does. Games use loot boxes, progression systems, guild duties and night schedules, built by behavioral designers to lengthen sessions. The goal is control, not necessarily abstinence.

TV and streaming. The harm is not hours alone but passivity: stimulation with no skill, no relationship and little memory. Tools: - Pay per episode for anything new, so buying is a deliberate decision. - A 20-minute break after every episode. - A content-to-production ratio: for each hour consumed, work toward an hour of something made, gradually. - Watch actively, with a question in mind. - Notice the “comfort show”: a simulation of company that can let real company wither.

Background audio. The addiction is to the absence of silence. Start with five minutes of a daily task without audio (driving the first leg, washing dishes). Extend weekly. Then sit 15 minutes without audio. Discomfort is the unused system restarting, not a symptom.

Music during exercise. The Kernel is not against music. **[Kernel hypothesis]** A dependency version can mask body feedback and effort calibration. Self-test: can you finish a whole workout without it? If not, try one music-free session a week (15-20 minutes at first). Name body sensations (“left calf tight, breathing labored”). Alternate over 8 to 12 weeks toward roughly half your sessions music-free, so music is a choice. The discomfort usually passes within 2 to 3 sessions. This is the Kernel’s own framing, not an established condition. Treat it as a useful self- check.

Identity. “Gambler,” “gamer,” “shopper” and “film buff” become part of the self. The Kernel’s reframe: the activity was a phase of the identity, not a permanent feature. The drive is not the problem; the vehicle was. The gamer can become a designer, the gambling drive a competitive craftsperson. For gambling, keep the non-financial rule above.

Genetics and tests

[Kernel hypothesis] The Kernel links three variants to behavioral addiction. These links are not trial-tested, and genotype does not tell you your addiction type.

Variant	Kernel idea	Caution
DRD2 A1	Fewer dopamine D2 receptors (the "roughly 40%" figure is the Kernel's own, unsourced), so ordinary pleasures feel thin	Said to be over-represented in gambling, gaming, eating and shopping. Evidence mixed.
COMT Val/Val ("Warrior")	Fast dopamine clearance, sharp peaks and drops, intensity-seeking	Personality mapping is a hypothesis
MTHFR C677T (homozygous)	Lower dopamine and serotonin synthesis, so ordinary life feels flat	Folate form and dose: ask your clinician

If you test, ask for a standard variant file from whole-genome sequencing. (Bisulfite sequencing measures DNA methylation and does not call these variants.) **Never delay starting for test results.** Access and money come first.

Milestones (Kernel projections)

The Kernel has no behavioral-addiction case study and no outcome numbers. This table is a Kernel projection, not trial results.

Time	Focus	What to expect
Days 0-14	Blocks	Self-exclusion done, saved cards and apps removed, trusted holder in place, automatic payments stopped, helpline saved
Days 7-30 Time	Accounting Focus	Mail sorted, every account logged, one number written, What to expect minimums automated
First 90 days	Highest impulsivity	Holder and sandbox card carry the load; essentials covered without borrowing
Months 3-12	Rebuild	Balances fall on a visible schedule; natural equivalents begin to carry what the behavior did; the behavior becomes something you can decline

Time	Focus	What to expect
Years 1-2	Consolidate	Triggers become rarer and are named quickly; keep the quarterly check
Years 3, 5, 10	Steward	Buffer built, no new debt; friction rules stay by design; peer support for others (Manning); big purchases still wait

The pull may never vanish. Structure and meeting the hunger are what hold. The years 3 to 10 trajectory is extrapolation.

FOR CLINICIANS

- Screen for suicidality and for co-occurring substance use, mood, ADHD and trauma. Ask about hiding, borrowing and legal exposure.
- CBT for gambling distortions is first-line. Naltrexone is an option with mixed evidence (prescriber decision).
- Gaming disorder is only a “condition for further study” in the DSM-5. Compulsive buying is not a formal diagnosis.
- Refer money questions to nonprofit credit counseling and legal aid.
- Kernel claims that are unsourced: the 40% D2 figure, DRD2 A1 in compulsive shopping, autoplay removal effects, debt-settlement percentages, and the “music dependency” framing.

For families and supporters

- You may be asked to be the trusted holder. Do it as structure, not punishment: hold cards, see activity, approve large buys, give a cash allowance.
- Do not bail out gambling debts or lend for “one last try” without a counselor’s advice.
- Watch for the mask change, and for secrecy.
- Take thoughts of suicide seriously: call or text 988.
- Gamblers Anonymous and Gam-Anon-type groups and a financial counselor help you too.

KEY POINTS

- Block access first, while calm. Willpower alone is the weakest protection.

- Day trading, crypto and fantasy sports count as gambling. Do not “redirect” the drive into risk capital.
- Numbers are numbers, not verdicts. Stop automatic payments today, then do the full accounting.
- Urges fade in 15 to 30 minutes if not fed.
- Meet the hunger directly, or it finds a new host.
- Crisis: 988; Problem Gambling Helpline 1-800-522-4700.

COMPULSIVE SEXUAL BEHAVIOR

> **In this chapter:** Compulsive pornography use, compulsive partner-seeking, sex used to manage feelings, and compulsive masturbation. The stance: no judgment, no shame as a framework, just the mechanism and what works. This chapter also covers what to do if urges involve harm to others. Resources are US-centred.

Emergency box - **Shame turning into hopelessness or thoughts of harming yourself: call or text 988.** Immediate danger: 911. SAMHSA: 1-800-662-4357. - **If a partner or anyone else is in danger:** National Domestic Violence Hotline 1-800-799-7233. - **If your urges, thoughts or behavior involve children, or anyone who cannot or does not consent, this chapter is not enough.** You are not beyond help, and getting help early protects others and you. Confidential, non-judgmental prevention help exists. In the US, **Stop It Now: 1-888-773-8368** (verify the number and hours before use; similar services exist elsewhere). Consider legal advice if any illegal behavior has occurred. - Mixing sex with drugs: see the Chemsex chapter.

Classification note and evidence labels

Compulsive sexual behavior disorder (CSBD) is in the WHO's ICD-11 (2022) **as an impulse- control disorder, not as an addiction**. It is **not a formal diagnosis in the DSM-5**. The Kernel uses "addiction" framing and the same recovery architecture as other addictions. That framing is contested. Evidence labels in this chapter: - **[Established]**: the dopamine and opioid basis of sexual reward, variable-ratio reinforcement, shame and secrecy as maintaining factors, the Coolidge effect in animals. - **[Emerging]**: naltrexone, NAC, accountability software; trauma link (real but not universal). - **[Kernel hypothesis]**: porn-related brain changes, the 90-day window, oxytocin and vasopressin "bonding" claims, genetic mappings, the years 3 to 10 trajectory.

What it does and why it hooks people

Sex is one of the strongest natural dopamine events. The system is built to be rewarding, so it can be used compulsively. The problem is not the drive; it is the drive bypassing voluntary control.

Chemical	Role	Why it matters [labels vary]
Dopamine	Anticipation and wanting	Drives seeking. Tolerance can push escalation. **[Established]**

Chemical	Role	Why it matters [labels vary]
Endogenous opioids	The pleasure and relief of orgasm	Real, brief relief from distress; why naltrexone is studied. [Established; naltrexone evidence for CSBD: Emerging, limited]
Oxytocin / vasopressin	Bonding	Claims that porn and serial partners bypass bonding are speculative. **[Kernel hypothesis]**
Serotonin	Satiation, the refractory period	Said to be blunted by chronic compulsive use. **[Kernel hypothesis]**

The Coolidge effect. In mammals, a new partner renews sexual motivation after satiation. [Established in animals] Online porn and dating apps offer unlimited novelty, so the satiation brake never engages.

CSBD versus high drive

This is CSBD (ICD-11 criteria)	This is not necessarily CSBD
Persistent failure to control intense, repetitive sexual impulses despite wanting to	High drive or frequency that is under voluntary control and not harmful
Continuing despite significant distress, relationship damage, health risk or impairment	Unconventional interests that are consensual and cause no distress or harm
Neglecting health, responsibilities or activities	A temporary increase after a life change
Present about six months or more	Sexual dissatisfaction that is a relationship problem

Frequency, kind of activity and how conventional it is do not define the disorder.

Four patterns

Pattern	What it looks like
Compulsive pornography use	Escalating use despite wanting to cut down, crowding out sleep and relationships, moving to more extreme content, sometimes trouble with arousal in real-life situations
Compulsive partner-seeking	Pursuit, then interest fades; rising risk as lower-risk encounters lose their charge
Sex for affect regulation	Using sex to manage anxiety, depression, loneliness, boredom or anger

Pattern	What it looks like
Compulsive masturbation without porn	Driven by the need for release; often the form with the most shame
The shame spiral	

Behavior → intense shame ("what is wrong with me") → distress → sex is one of the most reliable relievers of distress → the behavior recurs → deeper shame and secrecy. This is not an argument that the behavior is fine. It is an observation that shame as a treatment backfires, because the behavior is what relieves the distress shame creates. Take the shame out of the framework first.

Danger points

- **Harm to others.** See the emergency box. Urges toward children or non-consenting people need specialist help, not self-management.
- **Sexual health risks.** Book a sexual health check and treat it as care, not punishment.
- **Sex and drugs tangled together** (see the Chemsex chapter).
- **Secrecy.** A hidden pattern cannot be examined or held accountable. The longer it stays hidden, the worse discovery trauma is for a partner.
- **Escalation.** Rising novelty or risk as familiar sources lose their charge. The sobriety circles below exist to catch it early.
- **Shame to hopelessness.** Keep 988 in reach.
- **Medication effects.** Many antidepressants change desire and sexual function. Ask a prescriber and do not stop or change a medication yourself.
- **The mask change.** Another compulsive behavior or substance takes over (see the Gambling chapter).

Getting safe: first steps

1.**Safety.** Save 988. If anyone is at risk (including you), use the emergency box. 2.**Sexual health check.** 3.**Substances.** If drugs are part of it, see the Chemsex chapter. 4.**One person.** Decide today who you might tell: a therapist, a trusted friend or a group, even if you do not tell them yet.

Define sexual sobriety (weeks 1-4)

Sobriety cannot be "zero sexuality." That is neither healthy nor the goal. Write a three-circle definition, ideally with a therapist.

Circle	What goes in it	Example
Bottom line	Specific actions that count as relapse for you, a clear yes or no	"No intentional pornography use"; "no anonymous or casual encounters"; "no sex as my main response to distress." "No compulsive behavior" is too vague.
Middle	Not relapse, but reliably leads there	Alone in a hotel with no check-in; certain social media accounts; certain settings without a plan
Healthy outer	Sexual expression that fits your values	Sex in an established relationship, healthy dating, non-compulsive affection

For pornography, the Kernel defines sobriety as no intentional use of visual or written sexual content for arousal. Masturbation without porn is a separate question each person settles within their own values.

Block access and add friction

- **Accountability software** (Covenant Eyes, Bark, Circle or similar) that filters content or reports access attempts to a partner who knows you are working on this. Install it **before** the next urge, not during it. **[Emerging]**
- **Device friction.** Remove the mobile browser if the phone is the main access point, or move the computer to a shared room. Remove the private viewing context: the behavior "flourishes in privacy and withers in visibility."
- **For partner-seeking,** set a rule such as no dating apps after a set hour.
- **The four disruption points** (shared with other behaviors): see the trigger, surf the wave, block the access, meet the hunger. See the Gambling chapter's hierarchy of protection.

The first weeks: urges and shame

- **Urges** peak and pass in about 15 to 30 minutes if not acted on. Notice, locate it in the body, breathe, watch it rise and fall, perhaps with a timer. Each successful surf makes the next one easier.
- **Cold water on the face or a cold shower** is a quick physiological interrupt (the diving reflex). **[Emerging]**
- **About 90 days.** The Kernel cites about 90 days of abstinence before the reward circuit regains normal responsiveness, as the start of recovery, not the end. [Kernel hypothesis; debated. Treat as a rough guide.]

- **Tell someone.** Secrecy costs mental energy, removes accountability and worsens discovery trauma. How and when to tell a partner is a real decision. It goes best with a therapist's help, not as a confession in the middle of a bad night.
- **A lapse is information.** Tell your accountability person, reset the blocks, and look at the trigger and need underneath, without spiraling into shame.

Rebuilding: what sex was standing in for

Support and professionals - Certified sex addiction therapists (CSATs, directory at iitap.com). Evidence for particular models, including CSAT, is limited, so ask any clinician how they work and what they will measure. Look for training in sexual health and comfort with your identity, orientation and values. - Sex Addicts Anonymous (saa-recovery.org): 12-step, with a flexible sobriety definition that does not judge specific behaviors. - SMART Recovery: a non-12-step option.

Trauma and attachment. The Kernel says this is the behavioral addiction with the highest rate of underlying trauma, but not in everyone. Do not assume it. When present, it needs trauma- specific therapy (EMDR, somatic experiencing, trauma-informed CBT) alongside the behavioral work. Three routes: - Early sexual trauma that fixes an association between arousal and the trauma response. - Emotional neglect, so sex became the first and only way to regulate distress. - Insecure attachment: anxious attachment seeks sex to manage anxiety; avoidant attachment has sex without intimacy.

Treat the second by building other regulators (exercise, behavioral activation, creative practice, connection, and the DBT TIPP skills), not just stopping the one you have.

What recovery builds toward. Not the absence of sexuality, but "voluntary, connected, satisfying sexuality": - **Voluntary control:** you can choose to engage or not, and to stop. - **Genuine desire** as the driver, not relief, urgency, novelty or habit. - **Connection:** emotional presence. - **Satiation:** a normal after-satisfaction state, not instant craving or shame.

The transplant. Redirect novelty and intensity into adventure, athletic competition, travel, or creative or entrepreneurial work. Redirect intimacy-seeking into deep, reciprocal relationships. Replace the affect-regulation function with regulators that carry no compulsive cycle.

Medication and supplements. [Emerging, limited] Naltrexone is a prescriber's decision. The Kernel also names NAC, 5-MTHF, zinc, magnesium glycinate and vitamin D; evidence for each in this condition is thin or mixed. Dose with your clinician or pharmacist, and check interactions. Never stop a prescribed medication on your own.

Genetics and tests

[Kernel hypothesis] These are the Kernel's links, not established facts. Do not treat any result as a diagnosis.

Variant	Kernel idea
DRD2 A1	Reward deficit; the “elevated rates in A1 carriers” and “40% fewer D2 receptors” figures are the Kernel’s own
COMT Val/Val	Pursuit and novelty-escalation pattern
MTHFR C677T	Lower serotonin synthesis, so a shorter satiation window
MAO-A low-activity	More impulsivity

Never delay starting for test results. Structure and honesty come first.

Milestones (Kernel projections)

The Kernel has no case study or percentages for this condition. This table is a projection, not trial results.

Time	Focus	What to expect
Days 0-14	Safe start	Helplines saved, sexual health check booked, one person identified to tell
Weeks 1-4	Structure	Sobriety circles written; software and device friction in place before the next urge
About 90 days	Reward circuit	A rough marker for beginning to regain responsiveness. The start of recovery. **[Kernel hypothesis]**
Months 3-12	Rebuild	Trauma and coping work; voluntary control, desire and satiation return
Years 1-2	Consolidate	Urges rarer; circles updated; accountability routine
Years 3, 5, 10 Time	Steward Focus	Sexual health checks, honesty routine and rules that protect others stay; loneliness is the likeliest later trigger; peer support What to expect (Manning). Extrapolation.

The drive does not vanish and relationships do not repair on a schedule.

FOR CLINICIANS

- Screen for suicidality, trauma, attachment, mood, anxiety, ADHD and substance use tied to sex.
- Use ICD-11 criteria and distinguish high drive from CSBD. Avoid shame-based approaches.
- Ask about harm to others and use appropriate referral and legal-reporting obligations. Do not assume.
- Order sexual health screening. Review medication effects on sexual function.
- Naltrexone and NAC evidence is limited and mixed. Porn-related neurobiology claims are debated.

For families and supporters

- **Partners:** your trauma is real and needs its own support (COSA, S-Anon, or individual therapy), separate from couples therapy. Your safety comes first. National Domestic Violence Hotline: 1-800-799-7233.
- Discovery of a long secret is a trauma. Expect time, not a schedule.
- If anyone minor or non-consenting is involved, do not wait: contact law enforcement or child protection as appropriate. Stop It Now (1-888-773-8368, verify before use) also supports worried family members.
- Do not use shame as a tool. It fuels the cycle.

KEY POINTS

- CSBD is an ICD-11 impulse-control disorder, not a DSM-5 addiction. “Sex addiction” framing is contested.
- High drive is not a disorder. Loss of control and continued harm is.
- Shame fuels the cycle; secrecy maintains it. Tell someone.
- Write a specific three-circle sobriety definition.
- Urges involving children or non-consenting people need specialist help now: Stop It Now 1-888-773-8368 (verify).
- Partners need their own support.

SOCIAL MEDIA AND SCREEN ADDICTION

> **In this chapter:** How to tell whether a screen habit has become a loop, how the design works, how to break it, and how to rebuild what it displaced. There is also a short parent section and condensed guidance on algorithms, misinformation and public accusations. Resources are US- centred. Many claims here come from one source, a risk taxonomy of social media; treat its ratings as one author's framework.

Emergency box - If screen or social media use is tangled with self-harm or suicidal thoughts: **call or text 988**. Immediate danger: 911. - A minor in danger online: the National Center for Missing & Exploited Children CyberTipline (CyberTipline.org) and a parent or guardian come first. - Witnessing or involved in violence: National Domestic Violence Hotline 1-800-799-7233, and 911 for immediate danger. - Distress from repeated violent content that you cannot stop watching: tell a therapist.

Is this actually what is happening?

This is not about hours. Two hours can be fine for one person and costly for another. The question is whether there is a **loop**: - **Compulsive checking** with no real trigger: opening an app before you have decided to, dozens of times a day. - **Distress on separation:** irritability, anxiety or a hollow feeling out of proportion when the phone is out of reach. - **Time loss:** repeatedly looking up to find time gone. - **Displacement:** sleep, work, relationships or exercise shrinking to make room. - **Failed attempts to cut back.**

If most are true, this chapter is for you. The general framework is in the Gambling and Behavioral Addictions chapter.

What it does and why it hooks people

- **Variable-ratio reward.** You do not know whether this check will deliver something good, and that unpredictability, not the content, drives compulsive checking. Platforms refine this with huge amounts of user testing. [Established mechanism]
- **Shared dopamine resource.** A reward system already strained by recovery from a substance or another behavior gets no rest from a device delivering constant small hits. **[Emerging]** If you are in recovery, this is not a separate habit.

- **Business model.** On a free platform, your attention and data are the product and advertisers are the customer. More time means more ad impressions, so the platform's incentive is to maximize your time. Creator content is often also affiliate marketing: enthusiasm can be a paycheck.

What it displaces

Domain	What gets displaced	Damage pattern
Cognitive	Sustained focus, layered reasoning, memory consolidation	Fragmented attention, shallow comprehension
Social	Reciprocal relationships	Echo chambers, parasocial drift, thinner ties with family and friends
Emotional Domain	Internally anchored self- What gets displaced worth, stable arousal baseline	Validation dependence, Damage pattern comparison anxiety, outrage habituation
Civic and ethical	Trust, local participation, tolerance for complexity	Distrust, withdrawal from participation, oversimplification

Find which domain is hit hardest in your life before you start the repair work below.

Danger points

- **Withdrawal-like state.** Abrupt, total removal can cause anxiety, irritability, restlessness, "phantom vibration" and poor sleep in the first days. Research on this as a formal syndrome is still emerging. **[Emerging]** The experience is real either way.
- **Hospital stays.** Inpatient settings often remove devices abruptly. Tell the care team that this is a real factor and ask about scheduled access, music, reading or visitors.
- **Sleep.** Late-night scrolling and bedroom devices.
- **Comment sections.** They overwhelm attention through deflection, tangents, contradictions, extreme voices, identity-based attacks, outrage, noise and repeated slogans. Go back to the source content before forming a view, limit comment exposure deliberately, and do not absorb comments raw.
- **Scams and exploitation.** Financial scams (crypto, pyramid schemes), harassment, impersonation and data misuse are the most frequently rated severe risks in the source taxonomy.
- **Violent content.** Performed or encouraged violence normalizes cruelty, rewards the person causing harm with an audience, harms the person on screen and desensitizes viewers. Do not share it, even with a condemning caption. Report it through the platform's specific abuse or violence category. If someone is in danger, call 911 first.
- **Public accusations.** Naming a specific person in public can carry real legal risk (see below).

- **Mucuna and other dopamine-raising supplements** carry real risk (see “Supplements”).

Breaking the loop

Treat these as structure, not punishment.

Environment design (do this first, today)

- **Grayscale the phone.** Color is part of the reward. Look under Accessibility settings. [Kernel claim; plausible]
- **Remove notification badges.** The red dot is a trigger independent of content.
- **Device zoning.** Keep high-stimulus apps off the device you use for focused work.
- **App hygiene.** Turn off autoplay. Prune who you follow regularly.

Sacred hours and spaces

- **No device for the first 60 minutes after waking.**
- **Bedroom device-free at night.** The charger lives in another room; use an alarm clock. The Kernel names this as one of the highest-yield changes.
- **Screens off about 45 minutes before sleep**, with a bedtime audio ritual.
- **Sabbath windows:** a recurring off-platform interval, protected the same way each time.

Time structure and content governance

- Rotate focus, social, movement and rest in blocks. Anchor daily rituals (morning reflection, midday walk, evening long-form activity).
- Audit your feeds quarterly. Add long-form and local sources on purpose.
- Label what you read (opinion, satire, verified). Save claims you doubt, revisit them with sources, and update your view in writing.

Personal limits

- A **daily time budget set in the operating system** at app level (Screen Time or Digital Wellbeing), not just intended.
- A **hard stop time each night**, enforced by the device leaving the room.
- A **dollar or time ceiling on purchases made directly from a feed**.
- A **monthly check** of actual time using the device’s own report.

Resetting the algorithm

A recommendation system ranks content by predicted watch time, based mainly on your last hours and days of behavior. It can be retrained. A full reset generally takes **one to two weeks** of deliberately engaging with what you want and skipping or marking “not interested” on what you do not. Clearing history for one day is only a start.

Platform	Main options
TikTok	Refresh For You Feed; Not Interested; Keyword Filtering
Instagram	Not Interested; Suggested Content limits; engage with what you want more of
YouTube	Clear or pause watch history; Not Interested; Don’t Recommend Channel
Facebook	“Why am I seeing this?”; Snooze or Unfollow instead of unfriending; Ad Preferences
X / Twitter	Switch to the chronological Following view; Not Interested

Menus change often. Check the current settings.

Tracking and privacy, accurately

- Trackers are small pieces of code that log activity and share it with ad networks. That is how a product seen in one app appears as an ad in another.
- The fear that a phone is secretly listening through the microphone to target ads has been investigated repeatedly by independent researchers and has not been substantiated. Combined data (trackers, permissions, social graph, purchase history) explains most eerie coincidences.
- Check app permissions (microphone, location, contacts) and revoke what an app does not need. Limit ad tracking at the device level. Use built-in browser tracker blocking. Third-party cookies enable cross-site tracking; browsers have been phasing them out, so check current settings.

The first two weeks

Week 1. Audit which displaced functions apply to your own day. Replace one scrolling block with music, a podcast or a 20-minute walk. Write a one-page weekly summary. **Week 2.** Add two deep-reading blocks and one in-person meetup. Trim follows and disable two of the noisiest notifications. Start the bedtime ritual.

Then expect waves: restlessness and boredom in the first days, then improving sleep and attention. Signs to see a clinician: depression, anxiety, panic, self-harm thoughts, or inability to reduce use despite repeated serious tries.

Rebuilding what it replaced

- **Social:** low-friction micro-meetups, a mentor pair on a real schedule, service or volunteering (the Kernel's "Manning," redirected service).
- **Identity:** private artifacts first (journals, essays, a portfolio) before anything is shared, so the work is not shaped by anticipated reaction. Skill ladders with real levels. A monthly check-in against your values, not performance metrics.
- **Emotional:** rebuilding self-worth that does not depend on external metrics is slow work, like rebuilding natural reward systems after a substance.
- **Stargazing** (fantasizing about becoming an influencer). It is forward-looking, funded by small reinforcements (each follower feels like a milestone). Industry surveys from 2025- 2026 suggest that about 46 percent of full-time creators earn under $1,000 a year, and only a small minority clear $50,000. [Emerging; survey-based] Treat creating as a private skill first, with audience or income as an unlikely bonus.
- **Fantasy "on virtual substance."** Platforms where you are the hero (avatars, filters, status) can produce a real reward-system high, unlike watching a film. The reward system cannot easily tell being powerful from the platform's feeling of it. [Kernel hypothesis]

Supplements

Dose with your clinician or pharmacist, and run every addition past an interaction checker. These support the first days and do not treat the pattern. - Magnesium glycinate, L-theanine, 5- MTHF, NAC: generally well tolerated; evidence for screen addiction is minimal. **[Emerging]** - **L- tyrosine** (a dopamine precursor): timing matters. Do not add during compulsive use. **Never while psychotic symptoms are active;** wait for psychiatric clearance. - **Mucuna pruriens** (a natural L-DOPA source): pharmacologically active, with a dangerous MAOI interaction and real side effects. Not a self-start supplement. Physician first. Also not during psychosis. - **Ibogaine** has no evidence for this condition and a serious cardiac death risk. Not recommended.

Treatment options by risk

Approach	Risk	Purpose
Environment design and sacred hours	None	Remove cues and friction-free access

Approach	Risk	Purpose
CBT or habit-reversal therapy Low		Interrupt the trigger-check-reward sequence; best-evidenced approach
Inpatient digital detox	Low to moderate (logistics, cost)	When self-directed attempts keep failing
Supplements above	Low, with interaction caution Support the first days	
Mucuna / L-DOPA support	Moderate	Physician only
Ibogaine or similar	High; not evidence-supported	Not recommended

Genetics and tests

The source has no genetics for screen addiction. The shared-reward-deficiency ideas in the Gambling chapter are **[Kernel hypothesis]** and apply here only by analogy. Never delay starting for any test.

Milestones (Kernel projections)

There are no case studies or outcome numbers. This is a projection.

Time	Focus
Days 0-14	Environment design, bedroom device-free, notification badges off, daily time budget set; expect withdrawal-like discomfort
Weeks 2-12	Feed reset (1-2 weeks of new signal), sacred hours habitual, first real meetups and deep-reading blocks
Months 3-12 Time	Replacement activities carry real reward; Focus monthly check against actual time; private creative work
Years 1-2	Quarterly input audits; limits reviewed; guide others
Years 3+	Standing safeguards (bedroom rule, time budget) kept

Developing brains: for parents and guardians

This section is for adults guiding a minor, not for minors. - The reward system (nucleus accumbens) matures years before the prefrontal cortex that handles impulse control and weighing consequences: accelerator

before brakes. The same variable-ratio design lands on a system with less capacity to resist. [Established that the timing differs; the "imprint" idea is Emerging] - Endorphin and oxytocin systems are especially plastic in adolescence. Repeated activation may shape what feels like relief or connection later. **[Kernel hypothesis]** - **Risk shifts by age:** under 18 (identity, empathy, learning), 18 to 25 (executive function, money, civic life), 25 to 50 (career, family, health habits), 50 to 75 (cognitive decline, scams, isolation).

Restriction does not match harm. Content varies on two separate axes: actual developmental effect (connective to toxic) and whether it is flagged as taboo or normalized as ordinary. Filters and conversations catch taboo content. Content that is toxic but looks ordinary and mainstream gets no correction at all. Do not only filter the taboo-coded. Teach the question "is it ordinary or widely shared?" separately from "is it good for me?"

Narrative campaigns and misinformation (condensed)

Reporting rarely works, and why. In the US, Section 230 of the Communications Decency Act generally shields platforms from liability for user posts and lets them moderate at their discretion. A platform is almost never legally required to act on a specific report. An unanswered report is not a glitch or your fault. The main exception is child sexual abuse material, which US platforms must report to the CyberTipline. Reform of Section 230 is actively debated across the political spectrum.

Shielding yourself from coordinated campaigns - Recognize coordination: near-identical phrasing or hashtags across many accounts, clusters of new accounts posting heavily, networks that only amplify each other. - Do not amplify by engaging, even to argue. Discuss it elsewhere. - Diversify sources. A narrative that appears only inside one platform's ecosystem deserves skepticism. - Prebunking: learning manipulation tactics in advance builds resistance.

Terms. Misinformation is false and shared without intent to deceive. Disinformation is false and deliberately spread. Malinformation is true information used to harm. "Fake news" is used both for fabrication and for "I dislike this," and that ambiguity is itself a tool. **The SOURCE test (apply it the same way to claims you like and dislike):** - **S**ourced: named author or outlet with a checkable record - **O**riginal or corroborated: traceable to a primary document or independent outlets - **U**nprovoked emotion check: does it rely on instant anger or fear? - **R**eplicable: would a neutral party land in the same place? - **C**urrent and in context: right date, intact context - **E**videntiary: verifiable facts, documents, data or named quotes

Discomfort is not a criterion.

Public accusations. Section 230 does not protect the person who posts. A false statement of fact that damages a named person can be defamation. Genuine opinion, framed as such, is generally protected. Accusing a named private person of a crime or abuse with no finding behind it carries the highest risk. The real recourse is a court or a lawyer, not a report button. This is not legal advice; see an attorney if a real dispute is in motion. If a safety issue (abuse) is involved, safety planning comes before legal weighing. Outing someone as LGBTQ without consent is a serious safety issue regardless of legal theory.

The source's 100-item risk catalog (rated Critical, High, Moderate, Emerging, across influencer and platform risks, misinformation, mimicry and loneliness, exploitation and data, and algorithmic and societal risks) is a single author's framework. The items rated Critical cluster around privacy and stalking, scams, polarization, emotional dependency, validation addiction, data exploitation and deepfakes. Use it as a prompt to find which domain is hitting you, not as a checklist to read through. Items 81 to 84 are missing in the source.

FOR CLINICIANS

- Screen for sleep, mood, anxiety, self-harm and substance use. CBT and habit-reversal therapy are the best-evidenced approaches.
- Digital withdrawal is reported but not an established syndrome. Plan for it in inpatient stays and ask the unit about scheduled access.
- Internet gaming disorder is a "condition for further study" in the DSM-5; ICD-11 recognizes gaming disorder. Social media "addiction" is not a formal diagnosis.
- Dopamine-precursor supplements (tyrosine, mucuna) should not be used during active psychotic symptoms or with MAOIs.
- Ibogaine has no evidence base here and a cardiac death risk.

For families and supporters

- Set rules with the young person where possible, and model them. Charge devices outside bedrooms for the whole household.
- Pay attention to both the taboo content and the "ordinary" content.
- Look for self-harm talk, sleep loss, secrecy and withdrawal from real life. Call or text 988 if there is risk.
- Do not use violence or humiliation clips to teach. Do not share them.
- Device monitoring of another person is a separate topic with its own ethics and legal questions that this chapter does not cover.

KEY POINTS

- The question is the loop, not the hours.
- Bedroom device-free at night is one of the highest-yield changes.
- Set limits in the operating system while calm.
- Resetting a feed takes one to two weeks of new signal.

- Reports rarely bring action; protect yourself structurally. Mucuna, tyrosine and ibogaine are not casual supplements.
- If screen use is tangled with self-harm: 988.

FINANCIAL RECOVERY

> **In this chapter:** How borrowing, pawning and quick-cash tools can keep running after use stops, and how to take that machinery apart. This is not financial or legal advice. It does not recommend any lender or product. It helps you see the pattern clearly enough to bring to a nonprofit credit counselor, a lawyer or a financial advisor. It applies to substances and to gambling and shopping. Resources are US-centred.

Emergency box - Thoughts of ending your life, or a financial crisis that feels hopeless: **call or text 988.** Immediate danger: 911. Gambling-related debt: National Problem Gambling Helpline 1-800-522-4700. - Local help with food, housing, legal aid and benefits: dial 211 or 211.org. - Coercion, trafficking or violence: National Human Trafficking Hotline 1-888-373-7888; RAINN 1-800-656-4673; Domestic Violence Hotline 1-800-799-7233. - **Release from incarceration is a period of high overdose risk** because tolerance has fallen. Read the chapter on incarceration before release.

Three different money problems

Problem	What it is
Financial damage	Money already lost: debt, collections, missed bills, poor credit. See the Gambling chapter's triage and accounting.
Financial procurement	Using the financial system in real time to get resources for continued use: a payday loan, pawning, or a cash advance to buy
Financial persistence (the echo)	The substance is gone but the borrowing machine built to fund it keeps running by itself

A person can be completely sober and still live inside a financial machine built during active use. The third problem has no name elsewhere in the Kernel, and this chapter is an original framework, not tested research. **[Kernel hypothesis]**

The two loops

1.**Active-use loop:** craving → borrow → buy → shortfall → borrow again. 2.**The echo loop:** a paycheck lands → repayments on old loans consume it → essentials are short → a new loan for rent, food or gas → the relief is real and immediate → repeat. No craving or purchase appears anywhere in this loop.

Why am I still taking out loans?

The automatic assumption, that it means a new or hidden addiction, is often wrong. Often the arithmetic itself keeps it going (cash-flow recursion):

Line item	Amount
Paycheck	$2,000
Payday loan repayments	-$800
Essential expenses	-$1,600
Deficit	-$400
New advance taken to cover it	+$400

The next payday repeats the shape. A learned behavior can also sit alongside the arithmetic: shortfall → borrowing → instant relief can become a rehearsed response to money stress. Both can be true. Telling them apart is most of the work.

Liquidity acquisition: access to the access

Zero dollars is normally a structural stop between a craving and a supply. Quick-cash tools defeat it, often in minutes: - payday loans, high-APR installment loans, title loans - pawn shops - credit-card cash advances - earned-wage and cash-advance apps - overdraft borrowing - borrowing from friends or family - selling or pawning possessions

Tools like self-exclusion, a spending sandbox and a trusted holder do not work against this layer unless they are built to.

Borrowing latency. The shorter the gap between an impulse and available cash, the less room for governance to step in. Today that gap can be shorter than a drive to a pharmacy: phone, app, approval, deposit; or an item carried to a pawn counter. Friction has to be built **before** the impulse, because it rarely survives being built during one.

Seven kinds of borrowing

Category	What it is
Procurement borrowing	To get a substance or fund a behavior
Survival borrowing	For real necessities because past damage drained cash
Rollover borrowing Category	New borrowing needed because repaying old What it is borrowing creates the next deficit
Impulse borrowing	Credit taken fast during an urge with no prior necessity
Collateral liquidation	Pawning, title loans, selling a possession
Relationship borrowing	Family or friends; carries relational as well as financial cost
Post-addiction financial echo	Borrowing continues after use stops because the cash-flow structure persists
Pawning	

Escalation often runs: checking, savings, credit cards, cash advances, payday lenders, friends, pawning, selling outright, title loans on a vehicle. The direction is toward costlier and more permanent liquidity. Pawned items usually yield a fraction of their value, and if not redeemed in time that value is gone. Some pawned items are livelihood tools (a work laptop, tools, a phone, an instrument), so pawning can reduce tomorrow's income.

Other pathways to resources (named, not explained)

People under enough pressure also get resources through informal labor, survival sex, selling to fund use, theft, and exploiting insurance or benefit systems. None is a moral failure; they are skills built under real pressure. Each carries its own risk and can outlast the substance.

Pathway	The real danger	Where to go
Urgent off-the-books labor	Urgency lets employers lower Legal aid and worker pay, safety and protections	resources via 211
Survival sex	Violence, exploitation, health exposure	Trafficking hotline, RAINN (above)
Selling to fund use	The income, network and skill can persist after use stops; staying in the role keeps cues alive	Counselor, sponsor; legal advice if exposed

Pathway	The real danger	Where to go
Theft	Legal risk, lost family and employment trust	Legal aid via 211 or a public defender, early
Insurance and benefits exploitation	Actively investigated and often prosecuted, possibly a felony	Caseworker, legal aid or credit counselor for legitimate hardship provisions and appeals

Why these can escalate use

Guilt from the act (stealing from an employer, for instance) is a new bad feeling, and the substance already used to blunt older feelings is the nearest tool for the new one. [Kernel hypothesis] Returning to the scene unnoticed can create its own anxiety-then-relief cycle. If someone innocent was blamed or suspected, the weight is **moral injury**, an established construct for harm that violates your own values, and it is heavier than ordinary guilt.

Three patterns make it worse: - **Internal condemnation:** harsh self-judgment with no route to repair. Accountability is appropriate; condemnation is not the same thing. - **The private promise** ("I will pay it back someday"). It is an unaudited debt that can never be marked paid. - **"I hope no one was really hurt,"** held without knowing.

The route runs on two tracks: the internal track (Amends to Self: replace condemnation with accountability that has somewhere to go) and the external track (amends to the actual person or business, where safe). Direct amends are made except when doing so would injure the harmed party or someone else, so a sponsor, therapist or sometimes a lawyer should be the first conversation about whether and how, **not a decision made alone when guilt is loudest.** Going straight to an employer about theft can carry legal and financial consequences.

The Kernel uses a Chernobyl metaphor: when condemnation, the private ledger and the unanswered "was anyone hurt?" all run unaddressed together, guilt compounds and spreads into relationships, finances, legal exposure and escalating use. Recovery from that point is longer, and it is possible. Intervene early.

Other tracks do not complete each other. A sentence served answers what the state required; it does not close the internal or relational ledger. Release arrives at a high-overdose-risk moment. Confession and absolution are real tracks within a faith tradition, and a person can be absolved while the guilt signal remains, because the nervous system responds to sustained change and, where safe, repair. Noticing the gap is not evidence against the faith track. It means more than one kind of work is needed. Bankruptcy and legal resolutions likewise do not settle the internal or relational ledger.

Getting stable: financial disaster recovery (a metaphor)

This borrows systems-engineering language. It is not standard financial terminology.

Idea	Question to ask
Recovery time objective	Not “when will my credit be perfect” but “how soon can essentials be reliable?” Housing paid, utilities protected, food, transportation, medical care funded, a checking account not routinely negative, a paycheck not instantly consumed by emergency borrowing
Financial uptime Idea	Can life run for 7, 30, 90 days with no new Question to ask emergency loan? This matches the 90-day stability window in the debt-rebuilding plan
Failover	When a surprise $300 expense hits, does it go to a payday lender or to a reserve, payment arrangement or support route?
Single points of failure	A car breaks, so work stops, so rent is missed. Name the one piece everything depends on
Incident response	A return to high-cost borrowing is not “back to zero.” Ask what specifically failed: buffer too small, unrestricted instant credit, income disruption, real emergency, impulse purchase, direct procurement, repayment eating the paycheck, or shame delaying a smaller fix. Repair that component

First steps 1. Stop non-essential automatic payments. 2. Complete the liquidity inventory (below). 3. Remove saved loan apps, earned-wage advance apps and card details. Add friction before the impulse. 4. Cover essentials first, per the priority stack in the Gambling chapter. Redirecting money to a protected automatic savings transfer works only once essentials are covered. 5. Bring the picture to a nonprofit credit counselor early (211.org can find one, or legal aid).

Liquidity inventory

Extend your debt list with these columns, because a payday loan or pawn ticket hides information a standard listing misses. This is honest accounting, not a moral ledger.

Field	Record
Source	The lender, app or pawn shop
Original amount	What you actually received
Current balance	Principal plus fees and interest
Fees paid to date	Often the most revealing number; fees on repeated small loans can exceed the principal
Cycle	One-time, occasional or standing rollover

Field	Record
Collateral exposed	A title, a pawned item, or none
Automatic debit date	Does it line up with payday?
Being replaced by another loan?	Yes or no. This one answer is often the clearest sign of rollover

Bankruptcy: a legitimate tool, and a possible scapegoat

Bankruptcy is closer to a full system restore than a patch. It is not a moral failure or something to avoid on principle. It can also wipe the numbers and leave the mechanism that produced them intact.

It may be the right tool when: - debt is genuinely unpayable relative to income, and minimums or negotiation are not realistic; - collections or wage garnishment threaten essentials; - it is pursued deliberately, with a bankruptcy attorney or nonprofit credit counselor, after some stability exists, not filed from inside a crisis as the only visible exit.

It risks becoming a scapegoat when: - it is used reflexively with no change to the borrowing loop; - it is expected to settle internal or relational guilt; - it is filed before the underlying pattern is addressed. Some debts (most student loans, many tax debts, debts from fraud) are usually not dischargeable. A repeat Chapter 7 typically requires roughly eight years after a previous discharge. Rules vary, so confirm with an attorney.

Life events that change the money picture

New pregnancy

It can be a powerful turning point and also sudden financial pressure. The urgency can push toward fast, high-cost loans for legitimate medical costs. Bring the finances to a nonprofit credit counselor or social worker **early**, before a new loan. Many places have financial assistance, medical-bill negotiation and benefit programs built for this. Bring the substance and medical picture to a clinician as early as possible, since timing matters clinically. Treat the urgency itself as a signal, not a reason to skip structure.

New HIV, STD or hepatitis C diagnosis, and prevention

A diagnosis creates sudden costs. Dedicated, often free resources exist, so check them before any quick loan: - **HIV:** the federal Ryan White HIV/AIDS Program funds care and medication for people without enough insurance, through state AIDS Drug Assistance Programs. - **Other STDs:** state and local health department clinics often offer free or sliding-scale testing and treatment. Planned Parenthood offers

sliding-scale care in many areas. - **Hepatitis C:** manufacturer patient assistance programs and expanded Medicaid coverage in many states exist, since cost has often pushed people toward high-cost borrowing. Talk to a health department or case manager first. - **Prevention:** PrEP is a daily prescription that greatly lowers the chance of getting HIV through sex when taken as directed; it is not a vaccine. **[Established]** The federal Ready, Set, PrEP program provides it free to eligible people without drug coverage. Vaccines exist for hepatitis B and HPV; manufacturers and health departments often offer assistance. There is no hepatitis C vaccine. Eligibility varies by state; 211.org or a local health department is the fastest way to what is available near you.

Milestones (Kernel projections)

The Kernel has no outcome data for this framework. This is a projection.

Time	Focus
Days 0-30	Automatic payments reviewed; liquidity inventory done; loan apps removed; counselor contacted
First 90 days	Count days without a new emergency high-cost loan (track it like any other milestone, not as a moral scorecard); essentials covered
Months 3-12	Failover exists (reserve or payment arrangement); rollover loops closed or restructured; amends decisions made with support
Years 1-2	Echo loop gone; buffer growing; bankruptcy decision (if any) made with a professional
Years 3, 5, 10	Standing safeguards (friction before impulse, delay on large purchases, a second person for big decisions) kept

FOR CLINICIANS

- Ask about borrowing, pawning and income sources, not only spending. Compulsive borrowing and compulsive spending are not identical; someone can stop discretionary spending and keep borrowing.
- Screen for suicidality, moral injury, trafficking, coercion and legal exposure.
- Refer to nonprofit credit counseling, legal aid and social work. Do not recommend specific lenders or products.
- This framework is original and not research-based; the systems-engineering vocabulary is a metaphor.

For families and supporters

- A sponsor is a witness and governance, never a banker or creditor.
- Warning signs of an active or echo loop: repeated pawning, payday or title borrowing, or requests for money.
- Do not lend to cover loan repayments without a counselor's advice.
- Help with the inventory, not the shame.

KEY POINTS

- Stopping use does not stop the borrowing machine. Look for the echo.
- Count days without a new emergency high-cost loan, not credit score.
- Build friction before the impulse: loan apps, card details, pawn access.
- Complete the liquidity inventory: fees paid and "replaced by another loan?" tell the most.
- Do not decide on bankruptcy or amends alone, and not in a crisis.
- Free public programs (Ryan White, Ready, Set, PrEP, 211) can prevent loans for health emergencies. Crisis: 988.